MANAGING IP IN SINO-US CLEAN ENERGY COLLABORATION - THE CASE OF THE US-CHINA CLEAN ENERGY RESEARCH CENTER (CERC)[***]

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Abstract: In the face of global pressure to save energy and reduce carbon emission, both China and the United States ("US"), as countries which respectively utilize a vast amount of energy, are anxious to cooperate in the search for clean energy. As part of the successful maintenance and promotion of Sino-US cooperation in clean energy research and development, it is extremely crucial to establish an appropriate intellectual property ("IP") sharing and licensing mechanism. To that end, the US-China CERC project is a flagship venture in the Sino-US clean energy collaboration which seeks to provide that very mechanism through a pioneer IP Management Framework. The Technology Management Plan ("TMP") regarding the exploitation of IP rights is an integral component of this framework as it regulates the sharing and exploiting of IP rights in the US-China CERC.

This paper introduces this novel IP Management Framework and focuses on the TMP formation process. Further, the paper analyzes the difficulties encountered in TMP negotiations and also investigates the effectiveness of the current CERC IP Management Framework, by evaluating its achievements in IP management obtained within the first five years after this framework was implemented. Notwithstanding the CERC's success, it still faces challenges in the creation of co-owned patents and the transfer of technology between both the US and China. In response to such obstacles, this paper proffers the refining of the CERC IP Management Framework to include an operational level as a solution. The envisaged operational level consists of an IP service platform, and an IP information and exploitation platform. With these refinements, both the implementation of the CERC IP Management Framework will be smoother and the participants' abilities to manage IP, strengthened. Ultimately, it is hoped that the refined framework will serve as the new model for cross-border US-China cooperation in other fields as well.

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1. INTRODUCTION

In order to strengthen research cooperation, facilitate the transfer of technology between China and other countries, and promote its key clean energy technologies on the international stage, the Chinese government has supported extensive scientific and technological cooperation between domestic universities, research institutions, enterprises, and relevant foreign agencies. The creation, operation, protection, and management of IP are important to almost all research and development activities, and technological innovation projects. Accordingly, the regulation and management of IP has a direct impact on the successful commencement and operation of joint research projects, especially in cross border collaborations.

On 17 November 2009, the Ministry of Science and Technology of China (MOST), the National Energy Administration of China, and the US Department of Energy (DOE) signed a Protocol for Cooperation on a Clean Energy Research Center (CERC Protocol) to set up the US-China CERC, which aims to promote cooperative research in the field of clean energy technology between China and US scientists and engineers.[1] The three consortia of clean energy technologies supported are the Advanced Coal Technology Consortium (ACTC), which includes Carbon Capture and Storage, the Clean Vehicles Consortium ("CVC"), and the Building Energy Efficiency consortium ("BEE"). The CERC encompasses a novel framework for protecting and sharing intellectual property ("IP Management Framework"). Under this framework, the "groundbreaking"[2] TMPs establish an effective channel for interest sharing and disputes resolution. In doing so, the TMPs provide for the management of IP in Sino-US collaborative research and lays down a strong foundation for cooperation in the field of clean energy between the world's superpowers.

Accordingly, this paper introduces the CERC's aforementioned novel IP Management Framework and in particular, focuses on the formation process of both the CERC IP framework and ACTC TMP. This paper also analyses the challenges faced by the CERC and proposes the refining of the CERC IP Management Framework to include an operational level as a solution.

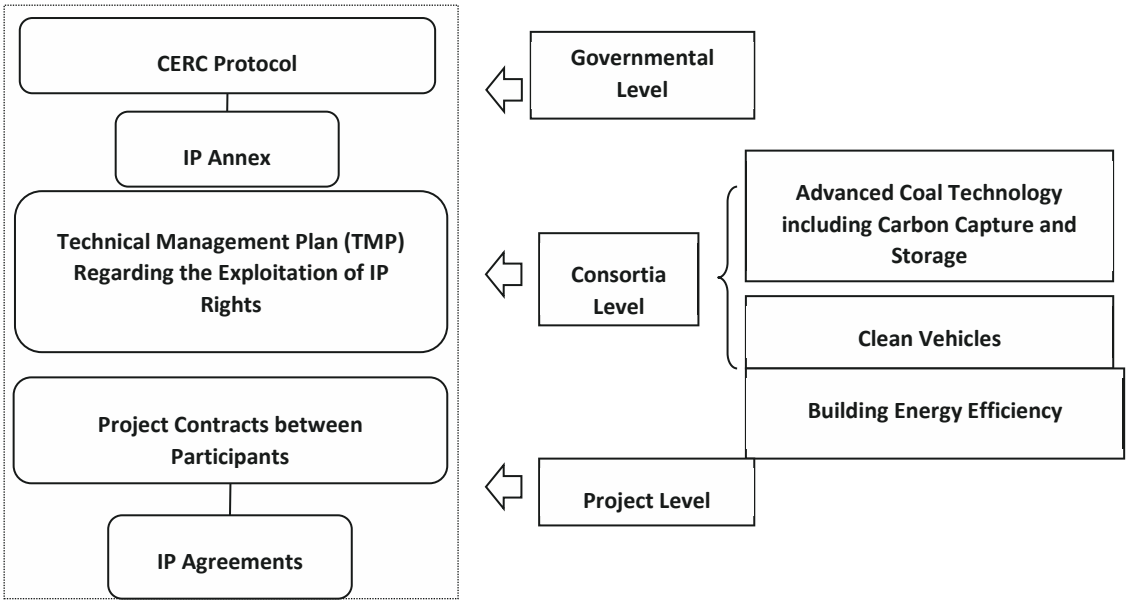
[1] U.S.-China Clean Energy Research Center, 'History' <http://www.us-china-cerc.org/history.html> accessed 4 June 2017

[2] National Center for Science & Technology Evaluation of China, U.S.-China Clean Energy Research Center Mid-term Evaluation Report (2012) page 99.

2. A NOVEL IP MANAGEMENT FRAMEWORK IN THE CERC

In the CERC, IP legal documents are negotiated and signed at three levels: the highest level is the governmental level which involves the US and Chinese governments, the second is the consortia level which involves the three technology consortia, and finally, the project level involves the specific projects' participants, as shown in figure 1. At the governmental level, the CERC Protocol with the IP Annex was signed in 2009.[3] The IP Annex strengthens IP protection and provides precedent-setting terms to foster joint creation and the exchange of IP, and in turn, influences the documents for signing at the consortia level by stipulating that each consortium has to jointly develop a TMP regarding the exploitation of IP rights. The TMP provides a channel for interest sharing and disputes resolution for IP management in jointly-funded research projects and serves to connect the CERC Protocol-IP Annex at the governmental level to the IP agreement at the project level. The IP agreement at the project level then complements, supplements, and implements the IP Annex and TMP, taking into account appropriate factors for the particular technology that is the subject matter of the jointly-funded research project.

Fig. 1. CERC IP Management Framework



3. IP MANAGEMENT REGULATION MAKING: CERC-ACTC TMP FORMATION

3.1 CERC-ACTC TMP Formation

Thus far, out of all the science and technology cooperation agreements that China has signed with foreign countries, only the IP Annex of Agreement for Scientific and Technological Cooperation between the Chinese government and the European community ("EU-China S&T Agreement") requires the contractor to develop a TMP. The EU-China S&T Agreement defines a TMP "as a specific agreement to be concluded between the participants about the implementation of joint research and the respective rights and obligations of the participants". Although the participants under the EU-China S&T Agreement were obliged to "jointly develop a Technology Management Plan (TMP) in respect of the ownership and use, including publication of information and intellectual property to be created in the course of joint research",[4] there is no evidence that such a TMP was indeed developed and endorsed by governments under the EU-China S&T Agreement. Therefore, the formation of the CERC's TMPs is revolutionary.

[3] Protocol between The Department of Energy of the United States of America and the Ministry of Science and Technology and the National Energy Administration of the People's Republic of China for Cooperation on a Clean Energy Research Center, < http://www.us-china-cerc.org/pdfs/US/US_China_CERC_Protocol_and_IP_Annex_English_17_Nov_2009.pdf> accessed 4 June 2017

[4] Agreement between the government of the People's Republic of China and the European Community on scientific and technological cooperation (22 December 1998) <http://www.cstec.org.cn/ceco> accessed 4 June 2017.

According to the CERC Protocol-IP Annex, "[t]he Parties or their participants shall jointly develop provisions of a Technology Management Plan (TMP) regarding the exploitation of IP rights. If the Parties cannot reach an agreement on a joint TMP in the particular research project agreement, work on the particular research project shall not commence."[5] In order to meet their obligations under this provision and support new project launches, the ACTC thus founded a special sub-project named "IP research project". This project is carried out by experienced IP experts, lawyers, and researchers from both countries, who are responsible for drafting and negotiating the CERC-ACTC TMP.

The formation of the CERC-ACTC TMP lasted half a year, in which three bilateral workshops were held, and 29 revised versions were discussed. The final version was signed by both the US and China CERC-ACTC directors in August, 2011 in the US, Washington DC, and endorsed by both governments.[6] The CERC-ACTC TMP subsequently served as the model for the other two consortia, *i.e.*, the CVC and the BEE.

3.2 CERC-ACTC TMP Contents

The CERC-ACTC TMP is divided into six parts and covers only IP protection, allocation, management, and utilization issues in the course of collaboration. Part one of the TMP (the "Preamble") outlines the basis for the TMP, its main scope of coverage including the applicable areas, and its objectives. Part two ("Definitions") defines "terms and key words, including 'intellectual property', 'background intellectual property', 'project intellectual property', 'cooperative activities', 'jointly-funded research project' and 'participant(s)'. Part three ("Ownership of Intellectual Property") proffers ways to identify the inventorship of project IP, to protect background IP rights, and to allocate project IP rights. Part four ("Management of Intellectual Property and Information Sharing") stipulates management rules for protecting background IP and using project IP, information sharing, and information security management. Part five ("Sharing and Protection of Interests in Intellectual Property Rights") states the principles of project IP rights allocation, licensing, and exploitation. Finally, part six ("Dispute Resolution") provides the rules and methods of dispute resolution. A summary of the main rules under the CERC-ACTC TMP are shown in Table 1.

[5] PROTOCOL between The Department of Energy of the United States of America and the Ministry of Science and Technology and the National Energy Administration of the People's Republic of China for Cooperation on a Clean Energy Research Center (17 November 2009), art II.B.2(d), < http://www.us-china-cerc.org/pdfs/US/US_China_CERC_Protocol_and_IP_Annex_English_17_Nov_2009.pdf> accessed 4 June 2017

[6] U.S.-China Clean Energy Research Center, 'Intellectual Prooerty' <http://www.us-china-cerc.org/Intellectual_Property.html> accessed 4 June 2017

Table 1. Main rules in CERC-ACTC TMP

Background IP determination	● IP created or invented outside the scope of the Joint Work Plan for Cooperative Activities. ● Ask participants to list all relevant IP that they assert as Background IP.
Background IP Use	● Any use of Background IP authorized by its owner may require an appropriate license (terms and conditions may be negotiated).
Project IP Allocation	● Who is the creator; who is the owner. ● Co-create, co-ownership. ● Governments maintain march in right.
Project IP Exploitation	**For "Jointly-Funded Research Projects",** ● The project's participants have the free right to use IP created during cooperative activities, for the purposes of executing the project/work plan for the particular jointly-funded research project. ● The project's participants in both countries have the right to obtain a non-exclusive license for the project IP. ● Any project IP licenses granted to third-parties shall be non-exclusive. ● A Project IP owner has no obligation to account to the co-owners or respective governments for any such arms-length licenses to third parties. **Other Cooperative Activities：** ● The project's participants in both countries have the right to obtain a non-exclusive license (not a trade secret) for only research and development purposes. ● Any licenses granted to third parties shall be non-exclusive (not a trade secret).
Knowledge Sharing and Confidentiality	● Make available to the other participants access to technical reports resulting from such cooperative activities that are not "business-confidential", prior to such reports becoming publicly available. ● Make regular publically available reports to the respective governments (except for confidential information or information that is required to preserve the novelty of an invention for purposes of patenting). ● Confidentiality agreement suggested.
Dispute Resolution	● Submit to an arbitral tribunal agreed by both parties, if it is unable to solve through discussion. ● Otherwise agreed, arbitration rules of the United Nations Commission on International Trade Law (UNCITRAL) shall give.

4. DIVERGENCE AND CONSENSUS REACHED IN CERC TMP NEGOTIATION

4.1 IP Exploitation in Joint Research Project

How to effectively exploit the IP rights produced in jointly-funded research is the key issue during bilateral discussion. Unfortunately, each country's respective laws and regulations, and differing positions have rendered this issue the thorniest to resolve during negotiations.

Part four of the TMP divides any research and development work within the scope of the ACTC Joint Work Plan into two types: "Jointly-Funded Research Project", and "Cooperative Activities" that do not include a "Jointly-Funded Research Project". "Jointly-Funded Research Project" refers to "'Cooperative Activities' whose scope of work/work plan involves Signatories to the CERC Protocol from BOTH countries providing collaborative research performers who are employed or sponsored by them and/or joint-funding (including in-kind contributions) of the scope of the work/work plan".[7] Others, such as "Cooperative Activities whose scope of work/work plan involves signatories to the CERC Protocol from BOTH countries but are funded by participants", are 'Cooperative Activities' that do not include a 'Jointly-Funded Research Project'".[8]

4.1.1 IP Licensing Policy in "Jointly-Funded Research Project"

Section four of part four of the TMP sets out the IP licensing policy in relation to IPs arising from "Jointly-Funded Research Projects". The policy is as follows:

"① An owner or owners from one territory of an Intellectual Property Project arising from such a project (and where necessary, Signatories to the CERC Protocol with an interest in such intellectual property) shall agree to negotiate in good faith terms of a nonexclusive license, to the other territory's Participants in such a particular "Jointly-Funded Research Project", to make, have made, use, sell or otherwise practice such intellectual property. Such licenses shall be subject to negotiation on favorable terms agreeable to the entities that have ownership of such Intellectual Property.

② Any licenses to a "Jointly-Funded Research Project" Intellectual Property Project granted to third-parties that are not Participants in the particular "Jointly-Funded Research Project", shall be non-exclusive and based upon fairly negotiated arms-length commercial terms and compensation which take into account the commercial benefits of the technology and the investment in the development of the technology, the benefits of licensing by territory, or for fields of use, and other factors deemed appropriate for the particular technology which is the subject of the "Jointly-Funded Research Project."

③ Unless otherwise required by law (or, consistent with applicable law, otherwise agreed by the owners of the particular Intellectual Property Project), an owner of "Jointly-Funded Research Project" Intellectual Property Project shall have no obligation to be accountable to the co-owners of such Project Intellectual Property or, unless otherwise required by law, to the Signatories of the CERC Protocol for any such arms-length licenses to third parties."[9]

Despite the standardization of the IP licensing policy, both countries have differing stances on the exploitation and licensing of IP in jointly-funded research projects. The US DOE encourages sharing, and seeks to prevent a party which is an IP owner from refusing a license to the other party in jointly-funded research projects on reasonable terms. In addition, the US is of the view that unless otherwise required by law, an owner can license third parties without being accountable to the co-owner. The Chinese position is however, more inclined to protect IP creators, in other words, researchers' interests. This is evident from how China has emphasized that such a license must be restricted to a non-exclusive license, and has asserted that the said license must be beneficial and acceptable to IP owners as a precondition. Such differing views led to a prolonged period of negotiations before the text of the CERC-ACTC TMP was finalized, as will be discussed below.

4.1.2 IP Licensing Policy in other "Cooperative Activities"

Section five of part four of the TMP addresses any potential IP licensing issues in connection with "Cooperative Activities" that do not include a "Jointly-Funded Research Project". The policy is as follows:

"① An owner or owners from one territory, of Project Intellectual Property arising from such a project (and where necessary, Signatories to the CERC Protocol with an interest in such intellectual property) shall agree to negotiate in good faith terms of a non-exclusive license to the other territory's ACTC Participants, for any invention made under such activities that is not a trade secret, for research and development purposes only.

② Any licenses granted by an owner or owners of Intellectual Property Project to third parties that are not Participants in "Cooperative Activities" shall be non-exclusive and based upon fairly negotiated arms-length

[7] TECHNOLOGY MANAGEMENT PLAN (Regarding the exploitation of Intellectual Property Rights) for the Clean Energy Research Center Advanced Coal Technology Consortium (ACTC), art. II.5 < http://www.us-china-cerc.org/Intellectual_Property.html> accessed 4 June 2017.

[8] TECHNOLOGY MANAGEMENT PLAN (Regarding the exploitation of Intellectual Property Rights) for the Clean Energy Research Center Advanced Coal Technology Consortium (ACTC), art. II.4 < http://www.us-china-cerc.org/Intellectual_Property.html> accessed 4 June 2017.

[9] TECHNOLOGY MANAGEMENT PLAN (Regarding the exploitation of Intellectual Property Rights) for the Clean Energy Research Center Advanced Coal Technology Consortium (ACTC), art. V.4 < http://www.us-china-cerc.org/Intellectual_Property.html> accessed 4 June 2017.

commercial terms and compensation which take account of the commercial benefits of the technology and the investment in the development of the technology, the benefits of licensing by territory, or for fields of use, and other factors deemed appropriate for the particular technology which is the subject of the 'Cooperative Activity.'"[10]

When compared with the licensing policy for IPs arising from "Jointly-Funded Research Project[s]", it appears that the requirements of licensing for "Cooperative Activities" that do not include a "Jointly-Funded Research Project", or non-government funded "Cooperation Activities", are not as stringent as the former.

4.2 Confidential Information Management

4.2.1 Geological Data Release and Sharing

Geological data plays a crucial role in energy technology research; if geological data is not supplied, experiments cannot be conducted. Thus, in research activities the US has repeatedly pushed for the sharing of geological data during the ACTC TMP's negotiation phase.

However, whether in the US or China, geological data is closely related to national security. Thus, each country's existing regulations, to safeguard their own respective national security, makes it extremely difficult to share such geological information. According to the US' Freedom of Information Act (hereinafter "FOIA"), anyone may request government information. In other words, government information must be made available to the public rather than be kept secret. However, 9 types of sensitive and private information are exempt from the purview of the FOIA,[11] one of which is geological and geophysical information and data, including maps that involve wells. However, access to such geological data may still be possible if an applicant passes the US Geological Data Center's examination.[12] Nevertheless, the sharing of such information is still restricted as an applicant would have to sign a confidentiality agreement with the center which delineates the ways in which such geological data can be used and disclosed. Thus, there are restrictions on the US' end in relation to the sharing of geological data. Similarly, in China, regulations such as the "Law of the People's Republic of China on Guarding State Secrets", "Mineral Resources Law of the People's Republic of China", "Geological Data Management Regulations" and "Confidential Geological Data Management Rules" define a certain range of geological data as national secrets.[13] Persons who disclose such confidential information may face criminal prosecution and be guilty of an offense.[14] Given the disclosure restrictions in the US and the possibility of criminal sanctions in China, the sharing of geological data between the US and China is a particularly sensitive issue which requires careful treading.

4.2.2 Publication and Sharing of Research Result involving Patent Novelty

The ACTC TMP also requires that "both sides shall make regular publically available reports to the respective Signatories to the CERC Protocol, generally describing the research data produced, the project's progress and periodical achievements".[15] Under US laws, any state-funded collaborative research must present its research results and data regularly to the public for transparency purposes. However, as this is likely to result in the disclosure of Chinese state secrets, the two countries' have had different opinions on the sharing of research results with the US public.

This divergence in stances over the various issues led to months of negotiations between the US and Chinese IP teams. Finally, after 29 revisions, both countries reached a common consensus on the final TMP text. The US and China's respective opinions during the ACTC TMP's negotiation and solutions/consensus reached are articulated in Table 2 below.

[10] TECHNOLOGY MANAGEMENT PLAN (Regarding the exploitation of Intellectual Property Rights) for the Clean Energy Research Center Advanced Coal Technology Consortium (ACTC), art. V.5 < http://www.us-china-cerc.org/Intellectual_Property.html> accessed 4 June 2017.

[11] See Amendment to Administrative Procedure Act, § 3(e), 80 Stat. 251.

[12] Id., Sec. 4.1 (a), 6.1(z).

[13] Confidential Geological Data Management Rules, art.I.1.(2)

[14] Law of the People's Republic of China on Guarding State Secrets, art 48.

[15] TECHNOLOGY MANAGEMENT PLAN (Regarding the exploitation of Intellectual Property Rights) for the Clean Energy Research Center Advanced Coal Technology Consortium (ACTC), art. IV.2 < http://www.us-china-cerc.org/Intellectual_Property.html> accessed 4 June 2017.

Table 2. Divergence of opinion between the US and China in TMP negotiation and consensus reached

Difficulties / Focus	Article No.	Position/View		Consensus reached
		The U.S.	China	
Information Disclosure	IV 2	Requires US-China ACTC to make regular publically available reports to their respective governments generally describing the research data produced, the project progress, and periodical achievements.	Agreed to release research reports, except for those matters which cannot be disclosed to the public in accordance with applicable laws and regulations regarding secrecy, confidentiality or because of the need to preserve the novelty of an invention for purposes of patenting.	Confidential information or information that needs to be preserved for the novelty of an invention for purposes of patenting cannot be released.
IP Licensing	V 4.1 V 5.1	Requires that non-exclusive IP licensing provisions shall naturally extend to the licensee's subsidiaries or branches.	Sub-licensing shall be granted by the licensor independently; non-exclusive IP licensing provisions shall not naturally be extended to the licensee's subsidiaries or branches.	Sub-licensing cannot be naturally extended.
IP Licensing of Co-invention	V 4.2	Encourages sharing; prevents a party which is an IP owner from refusing a license to the other party in jointly-funded research projects on reasonable terms. In addition, unless otherwise required by law, an owner can license to third parties without being accountable to the co-owner.	The US position complies with Article 15 of the Chinese Patent Law. However, such licensing shall be restricted to non-exclusive licensing.	Any Project IP licenses granted to third-parties shall be non-exclusive. A Project IP owner has no obligation to be accountable to the co-owners or respective governments for any such arms-length licenses granted to third parties.
IP Licensing of Invention for Research Purposes only	V 5.1	Licensing may not be free; in the US, even licensing for only scientific research may involve a charge.	According to Article 69 of the Chinese Patent Law, any person using the relevant patent especially for the purpose of scientific research and experimentation shall not be deemed to be infringing patent rights.	Terms and conditions may be negotiated and shall not be contrary to each country's laws.

5. CERC IP MANAGEMENT FRAMEWORK IMPLEMENTATION: RESULTS AND CHALLENGES

5.1 Results：Enhancing mutual trust, and promoting collaboration and innovation

Overall, the CERC's "groundbreaking" IP Management Framework has enhanced mutual trust, and fostered collaboration and innovation between the US and China.[16] Further, the framework gives each country a guaranteed right to exploit IP in the other country's territory, which can facilitate access to foreign markets for new technologies. Simultaneously, it allows others to access new knowledge through lawful means, and promotes greater diffusion of technology. As such, the TMPs, bolstered by the various governments' endorsements, have been heralded for providing a channel of interest sharing and disputes resolution for IP management in Sino-US collaborative research.[17]

By ensuring that IP will be protected, and dictating how such IP may be shared or licensed in each country, the IP Management Framework and TMPs encourage open collaboration between the US and Chinese teams, enables researchers to safely bring forward their most innovative ideas, and allows others to build on new discoveries. These actions cumulatively result in positive spillover effects in the form of accelerating further progress in the field of clean energy.

[16] National Center for Science & Technology Evaluation of China, U.S.-China Clean Energy Research Center Mid-term Evaluation Report (2012) at p. 99

[17] Ibid.

Indeed, the success of the CERC's IP Management Framework is illustrated by its remarkable performance during the first five years after its establishment. Not only have there been no disputes between both countries, the number of patent applications of each consortium has significantly increased after the CERC's establishment in 2009. This is demonstrated in Table 3 below.

Table 3. Patent application number of consortium participants in five years before and after CERC

Consortium Name	Chinese participants		US participants	
Time period	2005-2009	2010-2014	2005-2009	2010-2014
ACTC	102	684	231	453
CVC	288	1001	1240	1949
BEE	408	4275	1210	1591
Total	798	7938	2681	6920

Similarly, Table 4 shows the number of published co-authored journal articles produced from the CERC's cooperative projects during the first five years (2010-2014) after the CERC's establishment. In the CVC, the number of published articles co-authored by the Chinese and US participants has surpassed that of articles co-authored only by US participants. Such results indicate that the implementation of the CERC IP Management Framework has indeed encouraged collaboration and innovation, accelerated knowledge sharing, and promoted the diffusion of clean energy technology between the US and China.

Table 4 co-authored articles published by CERC participants from 2010 to 2014

	Chinese	US	Chinese & US
ACTC	40	70	12
CVC	126	76	80
BEE	16	17	12

5.2 Challenges in CERC IP Management Framework implementation

Notwithstanding the success of the CERC IP Management Framework thus far, there have been considerable challenges in its formation, especially during TMP negotiations. Such difficulties are mainly attributed to differing legislations between both the US and China. Although consensus was eventually reached during negotiations, different legislations and their accompanying enforcements still pose the biggest threats to the successful establishment of this framework and the implementation of TMPs. The main challenges that consortia face in the implementation of the CERC IP Management Framework can be classified into the following two categories:

5.2.1 Co-owned patents of Chinese and the US participants

According to statistical data on IP outcomes in the first five years after the CERC's establishment (2010-2014),[18] there have been no co-owned patents created from the CERC's collaborative projects. The lack of success may reflect the concerns of both participants about their different legislation and the enforcement thereof, and the complexity of determining each party's rights and obligations in relation to co-owned patents. In addition, the want of a co-owned patent may indicate that there is still insufficient mutual trust between the Americans and the Chinese. This could be explained by the fact that national security concerns, including the fear of leaking technological secrets, and the constraints on patent exploitation when it is co-owned by both sides have not been completely eliminated.

5.2.2 Transfer of technology between the US and Chinese participants

Moreover, as aforementioned, some clean energy technologies are closely related to national security. As such, restrictions on the import and export of such technologies impede their cross border transfer. These limitations explain why the CERC has yet to result in the transfer of project IP technologies between China and the US, including the implementation of project IP in the other country, assignments or licensing of project created patent or know-how technology, software with copyright, and beneficial spillover effects on the clean energy sector.

6. SUGGESTIONS

To resolve the above challenges, this paper suggests that the CERC IP Management Framework should be refined by including an additional operational level. The operational level ought to include an IP service platform, and an IP information and exploitation platform. With these additional refinements, both the implementation of the CERC IP Management Framework will be smoother and the participants' abilities to manage IP will be strengthened. A summary of how the operational level will be incorporated into the existing CERC IP Management Framework is illustrated in figure 2 below.

[18] Institute of Scientific and Technical Information of China (ISTIC), 'CERC Patent and periodical Title Data Analysis Report' (November 2015).

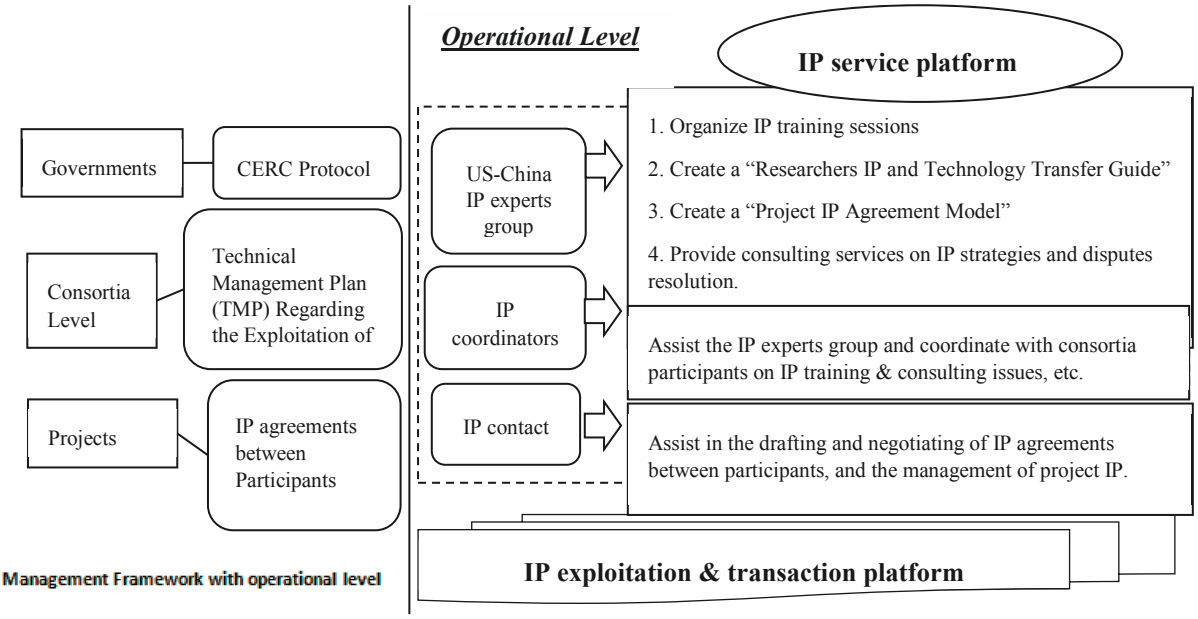


Fig. 2 CERC IP Management Framework with operational level

6.1 Establishing an IP service platform

The main part of the operational level is an IP service platform whose dominant role is to coordinate the IP activities across the governmental level, consortia level and projects level. It is suggested that this platform ought to comprise of a US-China IP experts group, IP coordinators, and an IP contact person. The US-China IP experts group will form the core of the IP service platform in organizing regular IP training sessions, creating a "Researchers IP and Technology Transfer Guide" and "Project IP Agreement Model", and helping CERC participants to deal with complex IP issues such as co-owned patent sharing and licensing. Simultaneously, it is envisaged that the IP experts group will also provide professional IP consulting services on amongst others, IP strategies, disputes resolution, and patent portfolio formulation. Next, the IP coordinators will serve as a point of coordination between the IP experts group and IP contact person on the consortium level. Additionally, the IP coordinators will assist the IP experts group in the organization of the said IP training sessions, guide consortia participants on how to implement the experts' advice, convey feedback to the experts group, and improve the IP coordination network for each consortium. Finally, the IP contact person will aid in the development of project IP agreements and will be responsible for managing IP in projects.

6.2 Establishing an IP exploitation and transaction platform

The other part of the operational level is an IP exploitation and transaction platform. This platform shall be equipped with an IP database which collects all background IP and the CERC's projects IP information. This database is to be made accessible to all CERC participants. The function of this platform is to promote greater sharing and diffusion of technology by encouraging cross-licensing among consortia participants and guiding participants on the establishment of patent pools. IP transaction activities are also to be organized regularly. This would correspondingly better connect CERC participants to external researchers and industry partners for the facilitation of the transfer of technology.

7. CONCLUSION

Ultimately, the CERC is a flagship venture in Sino-US clean energy collaboration. The CERC's "groundbreaking" IP Management Framework has enhanced mutual trust, and fostered collaboration and innovation between the US and China. Notwithstanding the CERC's success, it still faces challenges in the creation of co-owned patents and the transfer of technology between both the US and China. In response to such obstacles, this paper proffers the refining of the CERC IP Management Framework to include an operational level as a solution. The suggested novel IP Management Framework with an additional operational level would be an innovative solution to enable and promote joint innovation, and to effectively create, share and exploit, and protect and manage IP. It is envisioned that the recommended framework will be a good model for other Sino-US joint programs and potentially programs in other bilateral relationships to follow.

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PROTOCOL between The Department of Energy of the United States of America and the Ministry of Science and Technology and the National Energy Administration of the People's Republic of China for Cooperation on a Clean Energy Research Center (17 November 2009), art II.B.2(d), < http://www.us-china-cerc.org/pdfs/US/US_China_CERC_Protocol_and_IP_Annex_English_17_Nov_2009.pdf> accessed 4 June 2017

Amendment to Administrative Procedure Act, § 3(e), 80 Stat. 251.

TECHNOLOGY MANAGEMENT PLAN (Regarding the exploitation of Intellectual Property Rights) for the Clean Energy Research Center Advanced Coal Technology Consortium (ACTC), art. II.5 < http://www.us-china-cerc.org/Intellectual_Property.html> accessed 4 June 2017.

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