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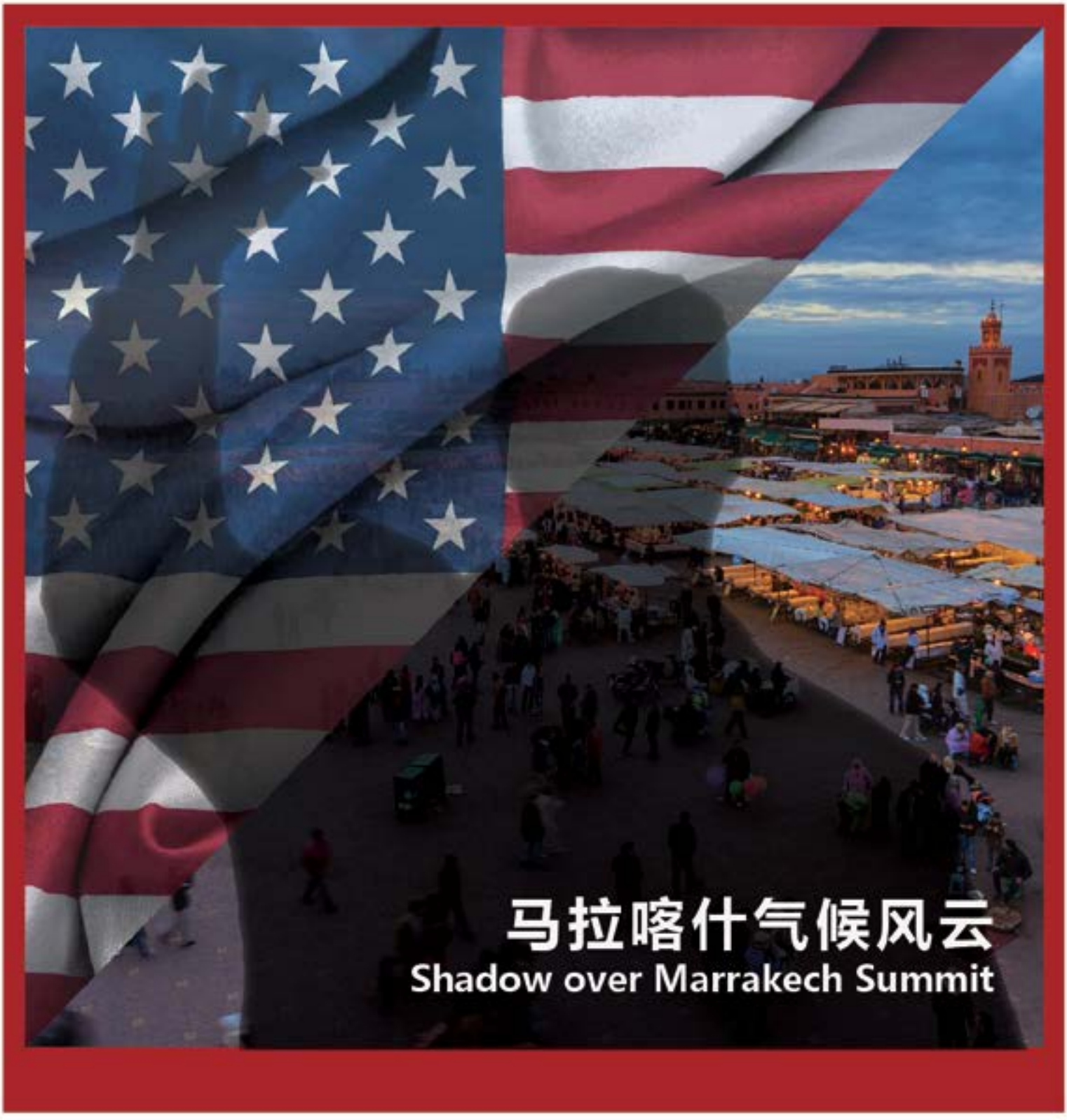

马拉喀什气候风云
Shadow over Marrakech Summit

总编　伊莎贝尔·希尔顿

英国人，国际新闻工作者，BBC资深主持人，《卫报》专栏作家，并曾为全球多家知名媒体撰稿。她是一位中国问题专家，同时担任英国皇家国际关系学会和英国皇家人文学会会员。2006年，她主持创立了“中外对话”（http://www.chinadialogue.org.cn）双语环保网站。

Isabel Hilton, editor and founder of chinadialogue.net, is a London-based international journalist, a former BBC senior broadcaster and a columnist for *The Guardian*.

She is an expert in Chinese affairs, a member of the Royal Institute of International Affairs and a Fellow of the Royal Society of Arts. In 2006, she set up the bilingual website (http://www.chinadialogue.org.cn) focusing on China's environmental issues.

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摩洛哥气候大会将在希望中拉开帷幕

《巴黎协定》正式生效，但真正实践起来并非易事，留给政府的行动时间并不多。

□ 乔伊迪普·格普塔

2016年11月初，一年一度的联合国气候变化框架公约（UNFCCC）缔约方大会在摩洛哥古城马拉喀什拉开帷幕。这场《巴黎协定》生效后的首次缔约方大会在充满希望的氛围中拉开序幕。此前，已经有两项与气候变化相关的重要协议获得通过，分别是国际民航组织（ICAO）的全球航空减排协议，以及逐步淘汰氢氟烃制冷剂的《蒙特利尔议定书》修正案。这两项协议均将于2020年开始生效。

《巴黎协定》得到了大多数国家的批准，在不到一年的时间里便正式生效，这令人们对马拉喀什峰会充满期望。

但现实的严峻冲淡了这份希望。实现以《国家自主贡献》的形式出现在《巴黎协定》中的承诺已然不易，而决策者还需要重新考虑是否得进一步升级政府许下的诺言。

国际社会已经认识到，现有的承诺并不足以将全球平均气温升幅控制在工业革命前水平以上2摄氏度以内。而要将温度升高幅度控制在1.5摄氏度之内则无疑是难上加难，这个目标写进《巴黎协定》中本身就是一个意外。就目前情况来看，即便各国完全兑现了各自的国家自主贡献目标，气温升幅还将达到2.7摄氏度。

UNFCCC秘书处已经要求政府间气候变化专门委员会（IPCC）着手研究如何推动各国达成1.5摄氏度的温控目标，并拿出一系列具体的建议。IPCC将在2018年推出相关特别报告。同年，《巴黎协定》也将迎来首次审查。

首要问题

11月7至18日召开的马拉喀什气候大会上，各国谈判代表着重讨论的首要议题是如何落实《巴黎协定》。种种迹象表明，谈判一旦涉及执行细节，发达国家和发展中国家就会就责任分担问题争论不休。《巴黎协定》达成以来，谈判代表们始终无法达成一份可以提交大会批准的决议。由于协定在细节问题上语焉不详，各国谈判代表不得不从最基础的内容开始就协定的落实展开谈判。

鉴于UNFCCC以往的谈判历史，这种情况尤其令人担忧。《京都议定书》达成于1997年，但直到8年后富裕国家才最终就削减温室气体排放的承诺细节达成一致，而美国根本就没有批准这一协定。

确定细节刻不容缓

就《巴黎协定》的执行细节达成一致已经到了刻不容缓的关头。首先，全球农业减产，越来越频发和升级的热浪，干旱、洪水和风暴，海平面上升，冰川消退，冰盖及永冻土融化等现象说明，气候变化的影响已经在全球显现。其次，《巴黎协定》计划于2020年开始实施，也需要一个执行标准。

另一个问题可能会引起更多争吵：2020年之前应该采取什么行动？目前《京都议定书》仍处于第二承诺期，但大多数工业化国家已经对其弃之不顾，并将大部分2020年之前的行动排除在此次缔约方大会的议程之外。

这种情况很危险，尤其是联合国环境计划署已经提出警告，要想在本世纪末达成1.5摄氏度的温控目标，全球温室气体排放量就必须在2020之前达到峰值。

气候基金惹争议

发展中国家也很担忧，因为他们没有获得减排及应对气候变化影响所需的资金。在 2009 年的哥本哈根气候大会上，时任美国国务卿希拉里 · 克林顿承诺，从 2020 年开始发达国家将为发展中国家应对气候变化提供每年 1000 亿美元的资金支持，并表示将在 2020 年前将资金支持逐步提升至这一水平。

她代表所有发达国家做出的这一承诺一直饱受争议。经合组织（OECD）去年的计算显示，以气候融资的形式向贫穷国家提供的资金已经达到每年 630 亿美元左右，但发展中国家对此表示强烈质疑，称经合组织重复计算融资，并将贷款算作赠款。

英澳两国政府今年统计的融资数额也与此类似，或将引发同样的争论。发展中国家指出，UNFCCC 的主要融资机构绿色气候基金（GCF）的储金不过 100 亿美元出头而已。

工业化国家代表几乎将有关 2020 年之前行动的议题全部挡在了大会官方议程之外。这一做法引起了发展中国家代表的不安。面对这种情况，主办国摩洛哥不得不采取折中方案，在马拉喀什峰会期间举行了为期两天的高层“促进性对话”，期待双方能擦出一些火花。

棘手的细节

资深气候谈判代表和观察员都知道，政府之间达成广泛共识是相对简单的一步，真正困难的是细节商讨，这是为什么参加大会的谈判代表们大多对谈判桌上将会发生的事心里没底。但这一次谈判也并非毫无基础。

国际民航组织关于控制国际航班排放的协议或许没能让所有人满意，但对航空部门这样一个众所周知曾经拒绝任何改革的部门来说，这至少是一个开始。

今年取得的另一项巨大进展就是《蒙特利尔议定书》修正案的通过。大多数国家都对此感到满意，原因在于该修正案允许包括印度在内的那些曾经反对过早淘汰制冷氢氟烃的国家也得到了折衷的时间表。鉴于这些国家的氢氟烃使用量在全球占比并不大，延期淘汰可能不会造成太大影响。该修正案被视为一个有助于抗击气候变化的成功外交案例。

气候适应缺乏重视

除了缓解行动，气候变化工作也需要人们的关注。那些适应失败的国家怎样应对气候损失与损害呢？

为了把这些问题提上大会日程，发展中国家不得不与发达国家进行斗争，但围绕这些问题的谈判却依旧含糊不清。许多发展中国家都开展了适应项目，但数量规模远远不够。目前的情况十分严峻，UNFCCC 气候适应基金的资金已经耗尽，但截至目前绿色气候基金仅同意资助 17 个适应项目。

随着气候变化导致的洪水风暴等灾害日益频发和升级，很多研究都关注到了由此带来的巨大损失与损害。气候活动人士和发展中国家（尤其是最贫穷的发展中国家）经历了长期而艰苦的斗争，要求将这一问题列入 UNFCCC 的谈判日程。2013 年华沙气候大会最终通过了“华沙损失损害国际机制”，但前提是发展中国家同意放弃所有涉及气候责任追究的内容。富裕国家，特别是美国，尤其害怕卷入与此相关的诉讼案件。

今年的气候大会上将对这一机制进行审议。贫困国家要想捍卫已经获取的那点成果已属不易，要取得进展更是难上加难。

气候正义

马拉喀什气候大会前夕，印度环境部长阿尼尔 · 马达夫 · 戴夫重申了该国长期以来对气候正义的诉求，认为富裕国家在抗击气候变化和帮助贫困国家方面应采取更多行动，因为目前污染大气的温室气体大部分来自富裕国家。

这一理论上无人争议的观点在实践中却一直遭到富裕国家的挑战。事实上，许多智库机构计算发现，发展中国家用于控制温室气体排放、应对气候变化影响的开支在其国民生产总值中所占份额要高于富裕国家。这一问题将会被一些政府代表和观察员不断提及，但很可能不会成为谈判重点。

乔伊迪普·格普塔，中外对话第三极项目南亚总监

Climate summit starts on a hopeful note

Implementing the Paris Agreement is not going to be easy given how little time governments have

□ Joydeep Gupta

The annual summit of the United Nations Framework Convention on Climate Change (UNFCCC) convenes in Marrakech, Morocco, this week in an atmosphere of hope following the Paris Agreement last year. There were also two other important agreements in 2016 – one by the International Civil Aviation Organisation (ICAO), which agreed to start cutting emissions from flights in the 2020s, and the other an amendment to the Montreal Protocol, which will see the phase-out of damaging refrigerants, also in the 2020s.

Another reason for hope is that the Paris Agreement was ratified by so many countries and has come into legal force within less than a year of being signed.

But that hope is also tempered by reality. Policymakers are being asked to reconsider the pledges made by their governments, which went into the Paris Agreement in the form of Nationally Determined Contributions, and which are going to be difficult to keep.

It has become clear that the existing pledges will be insufficient to keep the average global temperature rise since the pre-industrial age to within 2C. Meeting the 1.5C 'high ambition' goal – a surprise outcome of the Paris Agreement – will be even harder. In a full implementation scenario, the current NDCs add up to a 2.7C temperature rise.

The UNFCCC secretariat has requested the Intergovernmental Panel on Climate Change (IPCC) to come up with a series of recommendations on how countries can move towards the 1.5C goal, and the IPCC will bring out a special report on this in 2018, the same year the Paris Agreement will come up for its first review.

Primary concern

The negotiators gathered for the November 7-18 UNFCCC summit in Marrakech are primarily concerned about implementing the Paris Agreement. There is every indication that when it comes to details of implementation, the developed versus developing world wrangling over who does what will continue to dog the negotiations. Since the Paris Agreement, the negotiators have been unable to reach a decision to present to the summit for ratification. Given that the agreement is short on details, they will have to start the implementation negotiations almost from scratch.

This is especially worrying given the history of UNFCCC negotiations. The Kyoto Protocol was agreed upon in 1997


© R. Otaviano

but it took another eight years before rich nations agreed on the details of their pledge to reduce greenhouse gas (GHG) emissions. The US did not ratify the protocol at all.

No window

There is no such window available to agree on the implementation details of the Paris Agreement. Firstly, climate change impacts are already evident globally in the form of reduced agricultural output; more frequent and more intense heat waves; droughts, floods and storms; rising seas, receding glaciers; melting ice caps and permafrost. Secondly, the Paris Agreement is supposed to come into force in 2020.

A related issue will lead to more bickering: what actions will be taken before 2020? The Kyoto Protocol is still going through the second phase of implementation, but most industrialised countries see it as dead, and have managed to keep pre-2020 actions largely off the agenda in Marrakech.

This is dangerous, not least because the United Nations Environment Programme has warned that GHG emissions must peak by 2020 if the world is to have any chance of keeping to a 1.5C temperature rise by the end of the century.

Financial worries

Developing countries are also worried because they are not getting the money they need to reduce emissions or deal with climate change impacts. At the Copenhagen climate summit in 2009, then US Secretary of State Hillary Clinton promised that rich countries would give US$100 billion a year from 2020 for this purpose, and would use this decade to ramp up financial support to that level.

This became an overall pledge by developed countries and has been a contentious issue since then. The OECD calculated last year that it was already providing around US$63 billion a year to poor countries in the form of climate finance. But developing countries have contested this figure strenuously, accusing the OECD of double counting and considering loans as grants.

The British and Australian governments have come up with a similar figure this year, which may lead to similar arguments. Developing countries point out that the Green Climate Fund (GCF) – the main financing arm of the UNFCCC – has little over US$10 billion in its kitty.

With negotiators from industrialised countries keeping pre-2020 actions largely off the official agenda and their counterparts from developing countries being very upset about this, host Morocco has come up with the compromise of holding a high-level "facilitative dialogue" over two days during the Marrakech summit.

Devil in the details

Veteran climate negotiators and observers know that reaching a broad agreement between governments can be a relatively easy step because it's the details that are difficult. That is why many of the negotiators gathered in Marrakech are apprehensive about what will happen at the conference. But this time they do have some successful negotiations to build upon.

The ICAO agreement to control emissions from international flights has not pleased all governments. But at least it is a start for a sector that had earlier been notoriously resistant to any change.

The other big development this year was the amendment to the Montreal Protocol. This pleased most governments because those – including India – that were opposed to an early phase-out of the refrigerant HFC were allowed to have their way. Given the amount of HFC these laggards use, the delay may not matter much and the amendment is being rightly showcased as a successful example of diplomacy that will help combat climate change.

Tackling impacts

There are many good examples of how to mitigate GHG emissions. But what about the impacts of climate change; the ways to adapt to the loss and damage that is already occurring when countries fail in their adaptation attempts?

Developing countries have had to fight developed countries to have these issues on the agenda and negotiations on these issues remain vague. There are adaptation projects going on in many developing

> "the UN warns that emissions must peak by 2020 if the world is to have any chance of keeping to a 1.5C"

countries but many more are needed. Especially considering the UNFCCC's Adaptation Fund has run out of money and the GCF has so far agreed to fund only 17 adaptation projects.

There are many studies on the enormous extent of loss and damage being faced due to floods, storms and other disasters that have become more frequent and more intense due to climate change. Climate activists and developing countries – especially the poorest among them – have fought long and hard to have this issue included in the UNFCCC negotiations agenda. They managed to get the Warsaw International Mechanism for Loss and Damage adopted at the 2013 climate summit only after agreeing to drop all mention of liability – rich countries, especially the US, were particularly afraid of court cases in this area.

The mechanism will come up for review at this year's summit, and poor nations may have to fight to retain whatever little they have achieved, let alone make any progress in this area.

Concerns over climate justice

A few days before the Marrakech summit, India's environment minister Anil Madhav Dave reiterated the country's longstanding demand for climate justice that rich nations should do more to combat climate change and to help poor nations because most of the GHGs polluting the atmosphere today were emitted by rich nations.

This cannot be contested in theory but has been consistently contested in practice by rich nations. In fact, many think-tanks have calculated that developing countries are actually spending a larger portion of their GDP than rich nations to control emissions and deal with climate change impacts. The issue will be mentioned volubly by some governments and observers but it is likely to remain marginal in official negotiations.

Joydeep Gupta is South Asia director of The Third Pole.

各路专家畅想气候大会目标

从千亿美元气候资金到特朗普政府可能的气候行动，身在马拉喀什气候大会现场的五位专家告诉中外对话，他们期待本次大会能带来哪些成果。

□ 夏·洛婷

邹骥　中国国家应对气候变化战略研究和国际合作中心副主任

中国气候战略和政策是根据中国的国家利益制定的，而非谁当美国总统。其根本出发点是通过提升能效、增强能源安全来加快中国经济转型、改善空气质量、提高经济增长率，以促进增长的需求。

在特朗普总统领导下，中美间的气候合作需要一个新战略，这个战略要有新的要务和亮点。中美在能源和环保等议题的合作上仍有很多机遇，尤其是在新能源和能效的投资和贸易上。

特朗普在竞选中对气候变化政策持负面态度，但从法律上讲，退出巴黎协定和改变奥巴马国内减排目标的程序不仅耗时且需要付出政治外交代价，预计他入主白宫后未见得采取简单撤销的做法，但也不会再加码。川普上任后，在清洁能源、能源安全、能源贸易、技术研发方面依然可能有所作为。

安德鲁·斯蒂尔　世界资源研究所CEO

如果说《联合国气候变化框架公约》第 21 次缔约方会议（即巴黎大会）是为了把世界各国团结起来，朝着一个宏大目标共同努力，那么，今年我们需要各国政府领导人拿起铁锹，开始实干。我们必须为巴黎协定的落实制定明确的规则和进程，也必须在 2018 年开始逐步采取强有力的行动，对减排差距、已取得的进展、以及采取更大行动的机遇进行评估。

尽管 2016 年的国际气候合作是一大亮点，但所有国家制定的减排目标加起来仍然不足以将全球变暖控制在（前工业化时代水平的）1.5 甚至 2 摄氏度以内。马拉喀什谈判必须跟上我们在世界各国看到的政治势头，商界、城市和社区领袖们也必须加速现有的转型。

此外，各国必须制定更加具体的计划，让发展中国家得到实现其气候目标所需的资金支持。1000 亿美元（6800 亿人民币）气候资金路线图的

达成已经展现出气候资金领域向上的趋势。随着各方持续的协调行动，达成这一目标指日可待。马拉喀什大会有机会打消发展中国家对气候资金的疑虑，但如何确保这些资金真正到位也至关重要。

萨里木尔·胡克　国际环境与发展研究所高级研究员

从气候变化中最脆弱国家的角度，我希望在本月的马拉喀什大会上看到三个主要成果。

第一个也是最重要的，是各国能进一步巩固积极进取的势头，让1.5摄氏度的长期温控目标成为现实而不仅仅是愿景。《巴黎协定》以创纪录的速度生效，巴黎大会后保持的积极的政治势头如今要进一步落实为行动。

第二是采纳“华沙损失损害国际机制”执行委员会的建议，尤其是其提到的建立“损失损害”的滚动式五年计划。对脆弱发展中国家来说，这将是马拉喀什大会最重要的议题。

第三个需要解决的问题并非达成一项新决议，而是更好地落实老决议，尤其是发达国家向最脆弱发展中国家提供的气候适应资金的落实。承诺已经很多，但实际兑现的却寥寥无几。必须立刻扫清障碍，让已经确定用于支援脆弱国家的资金真正到位。

小若泽·萨尔内　巴西环境部长

只有各成员国在落实《巴黎协定》的规则制定上有所进展，马拉喀什大会才能取得成功。

巴西在低碳经济发展的道路上领先其他国家一步，因为我们已经取得了显著的减排成就，尤其是在控制亚马逊地区的毁林方面。我们的主要挑战是调动资源和投资来支持低碳经济的起步。巴西通过减少森林破坏和土地开发兑现了减排承诺，但这也给我们带来了很重的负担。

发达国家有义务兑现承诺，向发展中国家提供资源，用以维护那些维系着全世界社会和环境健康的生态群落（比如亚马逊）。这一重任不能只由生活在这些生态群落里的人来承担。

珍妮弗·摩根　绿色和平全球总干事

马拉喀什大会的任务是确定实现目标的规则，这些规则要让我们实现且超额实现减排目标。能体现大会成功的标志性成果包括：

采取明确的行动，通过强化现有的气候计划（或国家自主贡献）提升短期和未来减排量，保持全球平均气温上升不超过1.5摄氏度；

制定一套清晰连贯的规则，明确各国如何计算自己的减排量、如何在2018年和之后的各次评议中对减排目标进行再评估，以及各国如何计算其资金使用情况。

会议还需发布一系列决策和承诺，包含落实资金、能力建设，以及保持气候适应行动的优先核心地位，以确保贫穷和脆弱国家在执行气候计划和应对气候变化已产生的破坏性影响方面，都能得到支持。

最后，会议需要制定一套通向2050年的长期转型路线图。该路线图应该明确减少排放、培养气候适应能力和资金转移等方面的长期目标，并向企业、金融和公共部门发出信号：化石燃料气数将尽，为了建成零碳能源体系，投向煤炭、石油和天然气的亿万资金将转移到可再生能源领域。

夏·洛婷是一名驻伦敦记者，关注中国及环境问题

What will signal success at Marrakech?

As this year's UN climate talks get underway, we ask a panel of experts what action they hope to emerge from the two-week negotiation

□ Charlotte Middlehurst

Zou Ji, deputy director general, China's National Centre for Climate Change Strategy and International Cooperation

China's climate strategy and policy is in accordance with China's national interest and is not dependent on the US presidency. The fundamental incentive is China's need to drive growth by escalating the economic transition, improving air quality, boosting the growth rate through efficiency improvements, and strengthening energy security.

Under President Trump, climate cooperation between the US and China will need a new strategy with new priorities and highlights. There are still many opportunities for cooperation on topics such as energy and environmental protection, especially in investment and trade in new energy and energy efficiency.

During the campaign, Trump displayed a negative position on climate change. However, it would take tremendous legal effort to withdraw the US from the Paris Agreement and change the domestic emission reduction targets that were set by President Obama. Furthermore, such actions would require significant political and diplomatic risks. It is highly probable that Trump will not pursue withdrawal when he officially takes office, nor will he set more ambitious goals for climate action. Renewable energy, energy security, energy trade and technology development could become Trump's political legacy.

Andrew Steer, CEO of World Resources Institute

If COP21 was all about coalescing around a grand vision, this year we need government leaders to pick up their shovels and get to work. We should look for clarification on decisions about the rules and processes for implementing the Paris Agreement. We should also start the process to establish a strong moment in 2018 to take stock of the gap to reduce emissions, of the progress that has been made, and of the opportunities for even greater action.

Despite that international cooperation on climate change has been a bright spot in 2016, all the goals set by countries combined are still not enough to stay within 1.5C or even 2C of global warming [above pre-industrial levels]. Negotiators in Marrakech need to keep pace with the political momentum that we are seeing in countries around the world. Leaders in businesses, cities and communities also need to accelerate the transition underway.

Additionally, countries need to make more concrete plans about how developing countries will receive the financial support they need to achieve their climate goals. The US$100 billion (6,800 billion yuan) roadmap shows a positive upward trend in climate finance. With continued concerted action, that goal is within reach. Marrakech offers a chance to reassure developing countries of that. It's also critical to make sure that finance is actually accessible.

Saleemul Huq, senior fellow at International Institute for Environment and Development

From the perspective of the most vulnerable countries represented, I hope to see three main outcomes from COP22 in Marrakech this month.

The first, and by far the most important one, is the enhanced momentum toward making the 1.5C long term temperature goal a reality and not just an aspiration. The coming into force of the Paris Agreement in record speed speaks to continued positive political momentum after Paris which now needs to be built on to implement the agreement.

The second issue from the perspective of the most vulnerable countries is the adoption of the recommendations of the Executive Committee of the Warsaw International Mechanism on Loss and Damage. In particular, the five year rolling plan on Loss and Damage. For the vulnerable developing countries COP22 will be the "Loss and Damage COP".

The third issue that needs to be resolved, is not a new decision but the better implementation of old decisions, particularly regarding the delivery of finance from the developed countries for adaptation in the most vulnerable developing countries. Much has already been promised but little has actually been delivered. The bottlenecks to delivering the money already allocated should be removed immediately.

José Sarney Filho, Brazilian minister of the environment

COP22 will only be a success if member countries move forward on regulations to implement the Paris Accord.

Brazil has a head start in moving toward a low-carbon economy compared to the rest of the world, since it has attained significant results in reducing its emissions, primarily the result of controlling deforestation in the Amazon. Our main challenge is to mobilise resources and investments to consolidate the creation of a low-carbon economy. In Brazil we have met our obligations by decreasing emissions with the reduction of deforestation and land use, but this brings with it a very heavy burden.

The developed countries are obliged to uphold their commitments to pass resources to developing countries because the burden of maintaining the biomes which provide socio-environmental services to the world cannot rest only on those who live in these biomes, as is the case in the Amazon.

Jennifer Morgan, executive director of Greenpeace International

Marrakech is about deciding on the rules to implement the goals so they are not only achieved but overachieved. The outcomes that will signal success include:

Firstly, clear action to increase both immediate and future emission cuts, through strengthening existing climate plans (or nationally determined contributions), to keep the global average temperature rise to 1.5C.

Secondly, clear and consistent rules for how countries can account for emission reductions, assess the adequacy of their targets in 2018 and in later review rounds, and how countries will count their finance moving forward.

Thirdly, a set of decisions and commitments, from delivering on finance and capacity building to keeping adaptation front and centre, to ensure that poor and vulnerable countries are supported, both to implement their climate plans and to deal with the devastating impacts that climate change is having on their countries.

Finally, a way forward on getting long-term 2050 transformational plans in place on reducing emissions, building resilience and shifting finance. To signal to the corporate, financial and public sectors that fossil fuels are on their way out and that the billions invested in coal, oil and gas will shift to renewables, to achieve a zero-carbon energy system.

Charlotte Middlehurst is a London-based journalist with a special focus on China and the environment.

马拉喀什峰会闭幕：千亿美元气候资金悬而未决

马拉喀什气候峰会于上周六凌晨落下帷幕。尽管在若干问题上取得进展，但最关键的千亿美元气候资金仍未落实。

□ 乔伊迪普·格普塔　夏·洛婷　姚 喆　王亚敏

原计划11月7日至18日举行的联合国气候峰会直到11月19日凌晨才落下帷幕。会议就落实《巴黎气候变化协定》达成了紧凑的时间表，但并未就发达国家将提供的气候资金额度及到位时间等问题达成一致。各国政府将2018年定为《巴黎协定》执行办法制定完成的最终截止时间。

在马拉喀什举行的联合国气候变化框架公约（UNFCCC）缔约国大会出台了一系列旨在推动绿色经济发展、增强全球水资源和粮食供应安全的倡议，以帮助世界更好地应对日益严重的干旱、洪水、暴风、海平面上升以及其他气候变化的影响。

大多数倡议均为发达国家与发展中国家、国家和城市政府、世界银行以及下属机构、私营部门企业之间的双边或者国家小组项目，所有项目均不受UNFCCC管控，这令很多贫困国家担忧。

会议取得一定成果

本次会议取得了一些进展。加拿大、德国、墨西哥、美国宣布了它们到2050年的气候策略。值得一提的是，虽然美国当选总统唐纳德·特朗普曾放言要退出《巴黎协定》，但美国还是在此次会议上宣布了其气候行动计划。

《联合国气候变化框架公约》执行秘书帕特里西亚·埃斯皮诺萨在会议结束后表示："巴黎协定确定了全球气候行动的路线。今天在马拉喀什，各国政府重申了气候行动是紧迫、不可逆转、不可阻挡的。"《马拉喀什行动宣言》再次强调了这一点。

尽管会议在一些领域取得进展，却未能解决气候行动融资问题。为此，会议甚至将闭幕时间延后了数小时，超过190个国家的参会代表不得不滞留会场，在午夜后寒冷的走廊中继续争论不休。

摩洛哥外交部长、会议主席萨拉赫迪纳·迈祖阿尔在会议结束后表示："到2020年每年提供1000亿美元的资金承诺必须得到遵守。考虑到应对气候变化的任务之重大，将投资金额由千亿提高至万亿不可避免。2017年我们必须开始推进各个大规模项目，调动财务资源，保证各国可以获得推动适应措施所必需的资金。"

唐纳德·川普当选总统后美国退出《巴黎协定》的可能性让各国气候谈判代表空前地在除了融资问题之外的大多数议题上站在了同一条战线上。尽管如此，当触及2020年《京都议定书》失效之后，旨在帮助贫困国家应对气候变化影响的适应基金是否继续有效的问题时，谈判陷入僵局。四个发达国家承诺贡献8100万美元保障基金现阶段的运行，但其2020年之后的命运仍然充满不确定性。

印度环境、森林与气候变化部长阿尼尔·马达夫·戴夫表示，他希望融资部分的内容可以"透明、清晰、直接。所谓'直接'，就是一步到位，不再修改。"他说，各国本应谈定更多到2020年的短期气候行动，但总体上他认为本次峰会"基本正常，尽管有人试图破坏谈判。"

当被反复问及如果特朗普政府退出《巴黎协定》印度会作何反应时，戴夫只表示："我们将按照原计划执行协定。我们已经制定出了执行协定所需的95%的法律法规。"

资金问题依旧僵持不下

气候行动倡议人士也对资金问题目前面临的僵局表达了失望。气候行动网络南亚主管桑杰·瓦斯特表示欢迎“技术方面取得的进展”，但对“发达国家兑现其承诺，向发展中国家提供应对气候变化持续影响所必需的资金支持问题上缺乏紧迫感”表示失望。

“为期两周的会议接近尾声的时候，我们只想对没有任何发达国家政府做出明确具体承诺、加大气候变化行动资金支持力度表达极度的失望，”亚洲人民债务与发展运动的利迪·拿普表示，“私营部门参与不能代替公共资金的支持……在马拉喀什，发达国家所做的仅仅是逃避、推诿他们的责任，他们坚持采取备受质疑的方法计算他们应支付的资金，以掩盖现实。”

地球之友的阿萨德·雷曼表示：“科学结论已经十分清楚，我们只有三年时间去实现巴黎协定提出的（全球平均气温上升幅度控制在）1.5摄氏度之内的目标。按照现在发达国家摆在桌面上的承诺，这三年时间我们无法实现这样的目标。”

短期气候行动仍缺法律约束力

尽管进行了两轮相关“促进性对话”，但有关发达国家从现在到2020年期间的气候行动很大程度上依然没有具有法律约束力的协议来规管。大多数发达国家都没有正式通过2012年的《京都议定书》修正案，因此议定书框架下做出的资金支持承诺不再具有法律效力。印度呼吁所有发达国家在明年四月之前通过修正案，但是没有得到响应。

尽管在资金以及其他一些关键问题上遇到了瓶颈，马拉喀什峰会在其他领域仍然取得了进展。其中之一是，通过技术发展与转移，支持发展中国家的气候技术中心与网络得到了2300万美元的资金承诺。

另外，绿色气候基金（GCF）宣布，首批两个国家气候适应计划获批。尼泊尔和利比里亚将分别获得290万美元和220万美元。

而尽管存在争议，UNFCCC气候变化影响损失和损害的评估机制在马拉喀什峰会期间被保留下来并有了新的五年工作计划。

峰会见证了全球水资源稀缺框架的发布，以支持各国将气候变化与农业可持续用水相结合。但各方围绕如何处理气候谈判中农业问题的僵局仍然没有打破。富裕国家仍然只关注乳制品和水稻生产造成的甲烷排放问题，而穷国则大谈需要资金帮助已经深受气候变化影响的农民。

迈祖阿尔对于本次会议没能解决这一问题表示不满，并希望可以在定于2017年底召开的下次峰会上得到解决。

易受影响国家做出表率

与此同时，在马拉喀什峰会的最后一天，气候脆弱国家论坛（CVF）组织的47个成员国承诺，将在2020年之前尽快调整各自应对气候变化的国家自主贡献；在2020年之前尽早完成到本世纪中叶的温室气体减排长期发展战略；并尽快实现本国能源生产100%为可再生能源。

美国前总统阿尔·戈尔在会上发言时表示：“这些雄伟的计划和激励人心的承诺为其他国家做出了表率，让我们每个人都更加乐观地相信，可以及时地解决我们面临的挑战。”UNFCCC前执行秘书长克里斯蒂安娜·菲格雷斯表示：“我们的目标是在2020年之前扭转温室气体排放的曲线，将气温上升幅度限制在1.5摄氏度之内，实现有序和公平的绿色转型。为此，我们必须加速资本的转移，推动有关各方之间积极的合作。”

非政府组织“100%可再生能源”的迪波尔·巴鲁亚表示：“孟加拉做出了国内能源生产向100%可再生转变的承诺，向我们展示可再生能源可以解决能源贫困。孟加拉政府将与最易受影响的国家一道，在此前成功经验的基础上共同努力，保证未来子孙后代在这个地球上的福祉。”

联合国秘书长可持续能源特别代表、“人人享有可持续能源”倡议首席执行官雷切尔·凯特表示：“这些易受气候变化影响的国家，无论是处在发展的哪个阶段，都发出了一个明确的信号，那就是我们正在前进，直面挑战，建设清洁、强韧、包容的经济。”

绿色和平国际执行总监詹妮弗·摩根说：“这47个应对气候变化的前线国家做出的承诺表现出领导力和远见，而这是我们每个人都需要具备的。

乔伊迪普·格普塔，中外对话第三极项目南亚总监

夏·洛婷是一名驻伦敦记者，关注中国及环境问题

姚喆，中外对话气候政策沟通专员

王亚敏，气候变化分析师及顾问

Summit ends without funds deal

Despite progress on several fronts at COP22 there was a deadlock over finances for developing countries

□ Joydeep Gupta Charlotte Middlehurst Yao Zhe Wang Yamin

The November 7-18 UN climate summit concluded in the early hours of November 19 with a tight timetable on how to implement the Paris Climate Change Agreement but without a deal on how much money rich nations will pay for the purpose and by when. Governments set a deadline of 2018 to complete the rule book to operationalize the Paris Agreement.

The Marrakech summit of the UN Framework Convention on Climate Change (UNFCCC) saw a slew of initiatives to move towards a greener economy and to boost water and food security in a world made more vulnerable to droughts, floods, storms, sea level rise and other impacts of climate change.

Most of the initiatives were through bilateral or country-group projects between developed and developing nations, state and city governments, the World Bank and its associates, or private firms – all outside the control of the UNFCCC, a move that is worrying many poor nations.

Progress on other fronts

There was progress on other fronts. Canada, Germany, Mexico and the United States announced their climate strategies to 2050. In the case of the US, this plan came despite the threat of president-elect Donald Trump to pull his country out of the Paris Agreement.

Patricia Espinosa, executive secretary of UNFCCC, said after the conclusion, "The Paris Agreement set the course for global climate action. Here in Marrakech, governments underlined that this is now urgent, irreversible and unstoppable." The Marrakech Action Proclamation underlined this.

Despite the progress on other fronts, the issue of finance could not be resolved, though it delayed the end of the summit by hours and kept delegates of over 190 countries

> "Governments underlined that climate action is now urgent, irreversible and unstoppable."

arguing in the cold corridors of the venue well past midnight.

Salaheddine Mezouar, Morocco's foreign minister and president of the conference, said after the conclusion, "It will be necessary to respect the commitment of US$ 100 billion from now until 2020. Faced with the magnitude of what is required for dealing with the impacts of climate change, turning billions into trillions is indispensable. 2017 must be the year of large scale projects, of mobilising finance, and accessing financial facilities that will be necessary for adaptation."

The threat of an US government under Donald Trump pulling out of the Paris Agreement united climate negotiators from developed and developing countries as never before, on most issues except the vexed question of finance. Talks broke down on whether the Adaptation Fund – set up under the Kyoto Protocol to help poor nations cope with climate change impacts – would continue after the protocol expires in 2020. Four developed countries pledged USD 81 million to keep the fund running for now, but its future beyond 2020 remains uncertain.

Anil Madhav Dave, India's Minister for Environment, Forests and Climate Change, said he wanted the part about finance to be "transparent, clear and straight. By straight, I mean, don't start adding things later." Dave said there should have been more climate action pledged between now and 2020, but overall he found the summit had been "on track, despite attempts to derail it."

Asked repeatedly about the possible reaction by India if Donald Trump pulled his country out of the Paris Agreement, Dave would only say, "We have to go ahead with implementation of the agreement. We already have over 95% of the laws necessary to do so."

Deadlock over finance

Climate activists also expressed disappointment about the deadlock over finance.Sanjay Vashist, Director of Climate Action Network South Asia, welcomed "progress made on technical fronts" but expressed disappointment about the "lack of urgency shown by developed countries on delivering their promise of providing necessary funding to developing countries to cope with the incessant impacts of climate change."

"At the end of these two weeks we just want to express our extreme disappointment that no clear and concrete increases in climate finance pledges have been put forward by developed country governments," said Lidy Nacpil of the Asian Peoples' Movement on Debt and Development. "Private sector involvement is not a substitute for public finance... In Marrakech, all the developed countries did was try to evade and postpone their responsibilities, insisting on highly questionable methods for calculating their financial contributions to mask the paltry reality."

Asad Rehman of Friends of the Earth said, "The science is clear, we only have three years before the Paris Agreement's goal of 1.5 (degrees Celsius ceiling) is beyond our reach. The pledges on the table for those three years will not deliver this goal."

Legally binding action

The issue of legally binding climate action by rich nations between now and 2020 also remained largely unresolved despite two long rounds of a "facilitative dialogue" called for the purpose. Most developed countries have not ratified the 2012 amendment to the Kyoto Protocol, so pledges under the protocol no longer have any legal force. India called upon all developed countries to ratify the amendment by next April, but there was no response.

However, one achievement of the Marrakech summit was to retain progress on other fronts despite the deadlock over finance and some other key issues. The Climate Technology Centre and Network, which supports developing countries with climate technology development and transfer, received pledges of over US$23 million (158 million yuan).

The Green Climate Fund (GCF) announced the approval of the first two proposals for the formulation of national adaptation plans. Nepal will receive US$2.9 million (20 million yuan) for the purpose, and Liberia US$2.2 million (15 million yuan).

The UNFCCC mechanism on how to estimate the loss and damage already occurring due to climate change survived despite attacks during the Marrakech summit. It now has a new five-year work plan.

This summit saw the launch of a Global Framework on Water Scarcity to support countries to integrate climate change and sustainable water use in agriculture. But the deadlock over how to deal with agriculture in climate negotiations remained unresolved. Rich nations are still interested only in talking about methane emissions from dairy and rice paddies, while poor nations speak about the need for money to help farmers already reeling from climate change impacts.

Expressing his unhappiness about the lack of resolution on this issue, Mezouar hoped it would be resolved by the next summit, scheduled at the end of 2017.

Vulnerable countries take lead

Meanwhile, on the last day of the Marrakech summit, 47 countries who have formed theClimate Vulnerable Forum (CVF) pledged to update their national contributions to combating climate change as early as possible, before 2020; prepare mid-century, long-term low greenhouse gas (GHG) development strategies as early as possible before 2020; and strive to meet 100% domestic renewable energy production as rapidly as possible.

Speaking on the occasion, Al Gore, former US vice president, said, “These ambitious and inspiring commitments show the path forward for others and give us all renewed optimism that we are going to meet the challenge before us and meet it in time.” Christiana Figueres, former executive secretary of the UNFCCC, said, “Our goal must be to bend the curve of emissions by 2020 in order to limit temperature rise to 1.5 degrees Celsius and enable an orderly and just transition. For this we must accelerate the shift of capital and promote radical collaboration among all stakeholders.”

Dipal Barua of the NGO called 100% RE said, “Bangladesh has shown how renewable energy tackles energy poverty. With today´s commitment to move to 100% renewable energy domestically, the government, in coalition with the most vulnerable countries, builds on this success and allows future generations a decent life on this planet.”

Rachel Kyte, CEO and special representative of the UN Secretary-General for Sustainable Energy for All, said, “These vulnerable countries, at all stages of development, send a clear signal that they are moving forward and getting on with the challenge of building clean, resilient, inclusive economies.”

Jennifer Morgan, executive director of Greenpeace International, said, “This commitment by 47 countries on the frontline of climate change shows leadership and vision, just what we need from everyone.”

Joydeep Gupta is South Asia director of The Third Pole.

Charlotte Middlehurst is a London-based journalist with a special focus on China and the environment.

Yao Zhe is a strategic climate communications officer at chinadialogue.

Wang Yamin is a consultant and analyst on climate change.

G20国家在巴黎协定后还在支持大量海外煤炭项目

G20国家过去9年海外煤炭项目资金支持已达760亿美元，并仍有几十亿美元的煤炭项目在计划中，这些项目有极大风险成为“搁浅资本”。

□ 陈 晗

全球正向低碳能源转型，但发展中国家恐成为高排放和高污染的煤炭项目基地

由于气候变化带来的诸多威胁，国际社会必须尽快过渡到使用清洁能源，并避免燃烧大量化石燃料。煤炭燃烧是碳排放的最大来源，占全球碳排放的40%。然而，我们的研究发现，作为世界上最大的经济体的G20国家在继续投资于依赖煤炭的项目。政府可用于资助其他国家能源项目的公共资金本来就有限。虽然扩大能源获取是值得鼓励的，但这些投资通常选择燃煤发电厂，煤炭开采和其他煤炭相关项目，例如主要用于运输煤炭的铁路和港口。这些投资在开发能源的名义下破坏着发展中国家的空气、水、公共健康和环境资源。煤炭项目的成本和生命周期可以延续数十年，进而将发展中国家锁定在高排放和污染境地。

G20国家在绝大多数国际煤炭融资中都占比很高，其中大部分来自出口信贷机构（ECAs），如政策性银行和多边开发银行。 提供融资国家的企业（而不是接受国的企业）往往是这些项目的最大受益者；另一方面，新兴经济国家仍然需要应对这些煤炭项目带来的经济、公共健康和环境的影响。

在自然资源保护协会和石油变革国际组织最近发布的报告，《碳陷阱：国际煤炭金融如何破坏“巴黎协定”和清洁能源部署》（Carbon Trap: How International Coal Finance Undermines the Paris Agreement）中，回顾了G20国家从2007年至2016年8月的国际煤炭融资情况。 报告和附录的数据库显示了正在筹资的煤炭项目的规模和性质。报告分析指出：

1. 在2007年至2015年期间，G20国家资助了价值760亿美元的国际煤炭项目。 中国，日本，德国和韩国占这一融资的80%。

- 中国融资250亿美元
- 日本融资210亿美元
- 德国融资90亿美元
- 韩国融资70亿美元

2. G20国家计划资助价值超过240亿

美元的煤炭项目，其中：

- 日本计划融资100亿美元
- 中国计划融资80亿美元
- 韩国计划融资20亿美元

3. G20煤炭项目融资的前三大目的地国是印度尼西亚（110亿美元），越南（100亿美元）和南非（70亿美元）。印度尼西亚和南非也是G20成员国。

4. 低收入国家获得的G20国际煤炭融资不到2%。 相反，多数资金流向中高收入国家。这与那些声称公共煤炭融资用于支持最贫穷国家获得能源的情况正好相反。

中国的海外煤电投资和清洁能源投资的契机

作为世界第二大经济体，以及最大的煤炭消费和煤电产能最大国，中国也成为过去九年来海外煤炭开采和煤电项目最大的投资国，因为这增加了海外投资机会。 鉴于中国煤电产能过剩，为这类项目进行投融资也为中国煤电设备制造商和工程建筑公司提供了海外商机。

中国已经认识到，对煤炭的过度依赖会造成严重的空气污染，气候和其他环境影响，并在空气污染重点区域进行了煤炭消费总量控制，要求减少煤炭消费量。 国家能源局已经颁布政策，停止建造新的燃煤发电厂，以避免煤电泡沫，这可能会让许多项目搁浅。政府明年全面启动的碳交易市场以及新的可再生能源和低碳能源项目更有可能加速这一进程。

中国银行监管委员会制定了“绿色信贷指引”，该政策要求银行在其融资决策中考虑气候变化，这一要求也适用于海外投融资。 同时，中国政府也正在推动绿色金融，包括绿色信贷和绿色债券的发展，以扩大对清洁项目的投资，减少对高污染项目进行投资。

一些多边银行和经合组织（OECD）国家的出口信贷机构已经承诺限制对煤炭相关项目的投融资。中国支持的亚洲基础设施投资银行和金砖国家新开发银行都表示要优先资助可应对气候变化的低碳项目；而且，中国已经承诺向其南南气候合作基金注资 200 亿人民币。 鉴于中国的目标是在国内从煤炭转向更加清洁的能源，以满足其气候和空气质量目标，并在国际上成为应对气候变化的引领者，无论从环境性还是经济性分析，现在是应该重新考虑是否继续对海外煤炭项目进行投融资了。

鉴于中国在可再生能源部署方面取得的巨大进展，中国可以利用这个机会更多的将海外投资转向可再生能源等清洁能源，而非煤炭。由于投资煤炭项目逐渐被视为搁浅资产，继续投资将会使中国面临财务风险，因为与煤电项目相关的成本将高于长期回报。另外，这些煤炭资产可能在其生命周期结束前就无法使用。

对G20国家的建议

通过低息融资和贷款担保，对煤炭开采，电力和基础设施项目进行优先选择，而不考虑诸如环境退化，污染和健康影响等许多外部因素的成本，这种做法将清洁能源置于不利地位。 G20 国家应认识到，对于煤炭基础设施的融资是一个碳陷阱——将受资助国置于空气污染、水危机以及温室气体排放的困境。对煤炭项目融资阻碍了全球低碳经济的进程。鉴于使用煤炭对于气候和健康的重大影响，现在是时候结束对煤炭项目的公共融资了。

为了使 G20 国家的海外融资符合全球气候变化目标并提高其透明度，我们提出以下建议：

- 作为经合组织成员的G20国家应加强对煤炭项目融资的限制，不仅包括煤矿，而且包括所有与煤炭相关的活动，如勘探和采矿。
- 国家政策制定者应根据其国情制定明确限制煤炭项目的融资指南，并制定明确的标准，确保未来的能源投资符合“巴黎协定”，并适当考虑外部成本。
- 政府和多边组织应披露所有公共机构的煤炭项目投资情况，如出口信贷机构，开发银行，大部分国有银行等。

陈晗，自然资源保护协会国际气候分析师

G20 finance overseas coal

G20 countries financed US$76 billion in coal projects in the past nine years. With more projects in the pipeline, they shouldstop coal financing or risk creating stranded assets

□ Chen Han

As the threat of climate change looms, the world must transition to cleaner energy as quickly as possible and avoid burning most fossil fuel reserves. Coal is of particular concern. It accounts for 40% of global carbon emissions from fossil fuel use, which is more than any other individual source.

Despite last year's Paris Agreement, G20 countries – the world's largest economies – continue to invest in projects that increase the world's dependence on coal. Governments have a limited pool of public funds that they can use to finance investments in other countries, including energy projects. While expanding energy access is a worthy endeavour, these investments often take the form of coal-fired power plants, coal mining, and other coal-related projects, such as railways and ports designed primarily to transport coal. These dirty investments damage the air, water, public health, and environment of developing nations under the guise of bringing energy. The costs and life spans of coal projects can stretch for decades, trapping developing nations into a system of incredibly carbon-intensive and polluting energy use.

> Between 2007–2015, G20 nations financed US$76 billion worth of international coal projects.

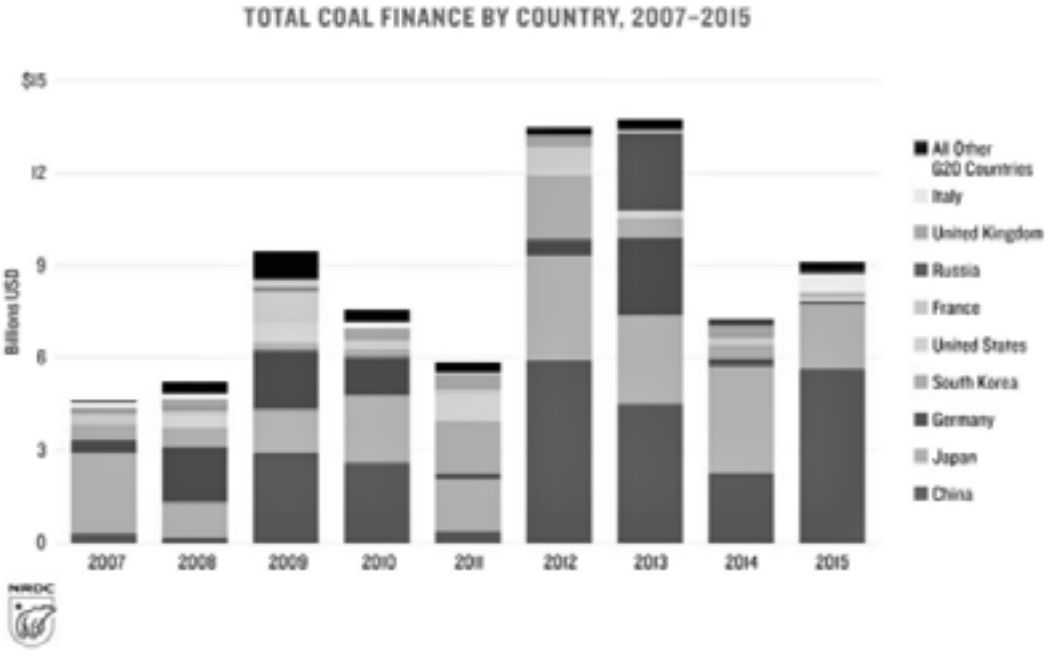
The governments of the G20 nations account for the vast majority of international coal finance, much of which flows from export credit agencies (ECAs) such as policy banks and multilateral development banks. Businesses in the financing country – rather than in the recipient countries, where the coal projects are built – are often the main beneficiaries of these investments. The emerging economies, on the other hand, are left to grapple with the financial, public health, and environmental impacts.

The Natural Resources Defense Council (NRDC), along with Oil Change International, recently released a report, Carbon Trap: How International Coal Finance Undermines the Paris Agreement, that reviews international coal financing by G20 countries from 2007 to August 2016. The report and accompanying database provide a window into the scale and nature of the coal projects being financed.

Analysis by the NRDC shows that:

1. Between 2007 and 2015, G20 nations financed US$76 billion (520 billion yuan) worth of international coal projects. China, Japan, Germany, and South Korea accounted for four-fifths of this financing.

- China financed US$25 billion
- Japan financed US$21 billion
- Germany financed US$9 billion
- South Korea financed US$7 billion

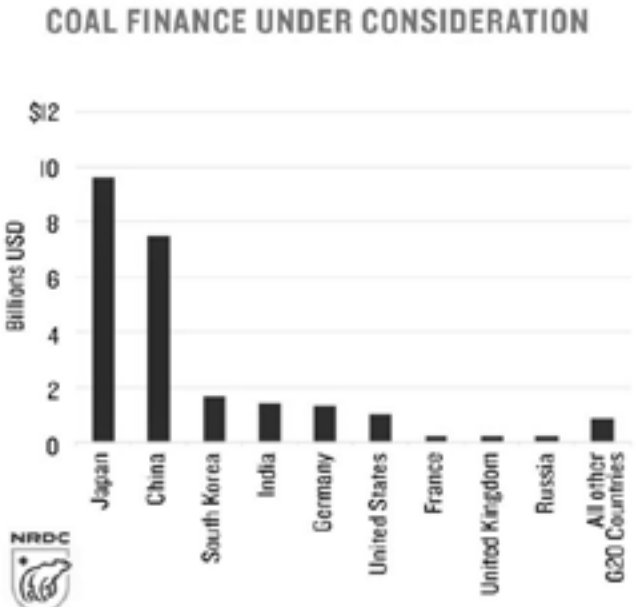


2. G20 nations are considering financing new coal projects worth more than US$24 billion (164 billion yuan).

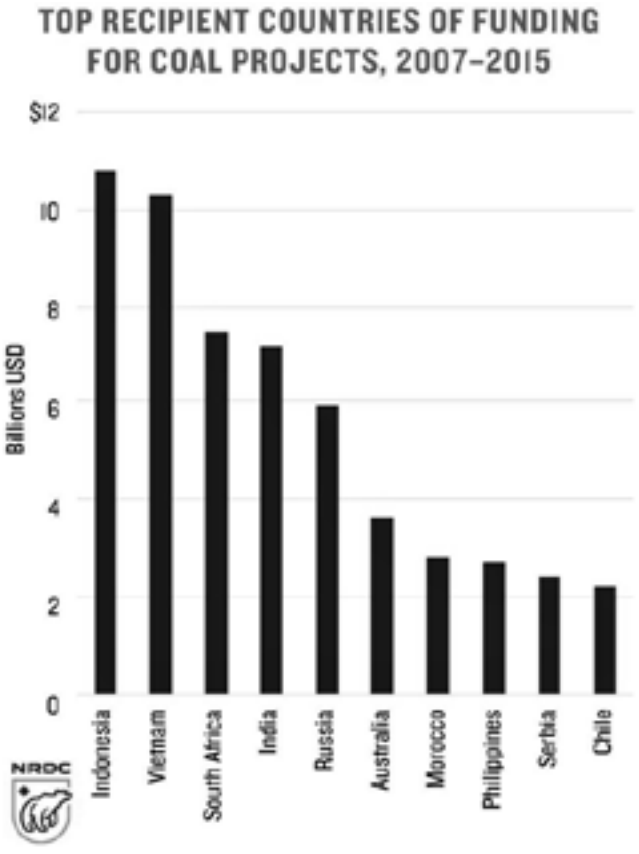
• Japan plans to finance US$10 billion

• China plans to finance US$8 billion

• South Korea plans to finance US$2 billion



3. The top three recipient countries for G20 coal project financing are Indonesia ($11 billion), Vietnam ($10 Billion), and South Africa ($7 billion). Indonesia and South Africa are also G20 members.



4. Low-income countries received less than 2% of G20 international coal financing.Instead, most of the money goes to middle-and high-income countries, contrary to frequent claims that public finance for coal is intended to help the poorest countries expand access to energy.

China's clean energy opportunity

China is the world's second largest economy, the largest coal consumer and has the most coal-fired power plant capacity. China has also become the largest financer of coal mining and coal power projects overseas during the past nine years, as it increased its financing for investment opportunities abroad.

Given the overcapacity of coal power within China, financing these projects also provides overseas business opportunities for Chinese coal-plant equipment manufacturers and engineering and construction companies.

Domestically, China has realised that its overdependence on coal is causing severe air pollution, and climate and other environmental impacts. It has set a coal consumption cap in key air pollution regions, which requires decreases in coal consumption. The National Energy Administration has issued policies to stop the construction of new coal-fired power plants to avoid a worsening coal power bubble, which threatens to leave many of the plants as stranded assets. The government is establishing a carbon cap and trade programme next year and continuing investment in renewable energy and low-carbon energy generation such as wind, solar PV, hydro and nuclear.

China's Banking Regulatory Commission has established the Green Credit Guidelines for Chinese banks, including their investments abroad, which requires them to consider climate change in their financing decisions. And the government is promoting the development of green finance, including green credit and green bonds, in order to expand investment in clean projects and reduce investment in carbon intensive, polluting projects.

Several multilateral banks and the export credit agencies for countries in the Organisation for Economic Cooperation and Development (OECD) have pledged to restrict coal financing. The China-backed Asian Infrastructure Investment Bank and BRICS New Development Bank have both expressed their interest in prioritising financing of low-carbon projects to address climate change, and China has committed 20 billion yuan (US$2.9 billion) to its South-South Climate Cooperation Fund.

Given China's goal of transitioning away from coal to cleaner energy sources domestically, and its efforts to become a leader in climate change internationally, now is the time when it should reconsider whether continuing to be a leader in financing coal projects abroad is a good idea both environmentally and economically.

In light of China's massive progress in renewable energy deployment, China can use this opportunity to shift more of its overseas financing toward clean energy sources such as renewables rather than coal. Since coal investments are increasingly seen as stranded assets, continued to finance coal puts China at risk of financial exposure, as the costs associated with coal power will be higher than the returns in the long run and assets may be rendered unusable before the end of their lifetime.

Time to end coal financing

Prioritising coal mining, power and infrastructure projects through low-interest financing and loan guarantees unfairly favours coal over clean energy alternatives because additional costs such as environmental degradation, pollution, and health impacts are externalised.

G20 countries should understand that financing coal infrastructure that will be around for decades is a carbon trap – locking recipient countries into many years of harmful air pollution, water impacts and greenhouse gas emissions. Financing coal impedes the global transition to a low-carbon economy. Given the grave climate and health impacts linked to coal use, it is time to end public financing for coal projects.

To bring G20 countries' overseas project finance in line with global climate change goals, and to improve transparency, we offer the following recommendations:

- G20 nations that are members of the OECD should expand restrictions on coal financing to include not just coal plants but all coal activities, such as exploration and mining.
- National policymakers should develop clear guidelines for limiting coal finance, in line with their national circumstances, with clear criteria for ensuring that future energy financing is consistent with the Paris Agreement, and with appropriate accounting for the costs of externalities.
- Governments and multilateral organisations should disclose coal financing from all public institutions, such as export credit agencies, development banks, majority state-owned banks, etc.

Chen Han is an international climate advocate at Natural Resources Defense Council.

特朗普当选总统或给全球气候带来威胁

对气候变化不以为然的特朗普当选美国总统，这会令美国站在全球气候行动和绿色经济转型的对立面吗？

□ 乔伊迪普·格普塔

唐纳德·特朗普若继续坚持竞选时期的主张，那么他的当选对于气候行动，特别是气候变化谈判来说，将会是一场灾难。不过这也可能成为发展中国家——特别是中国的机遇，有机会带领全球对抗气候变化。

如果特朗普遵守竞选承诺，那么他一上任就可能做出如下几个举动：废除巴拉克·奥巴马的《清洁电力计划》；宣布美国退出《巴黎气候协定》；叫停削减煤炭消费的工作；降低可再生能源的财政支持力度。

11 月 7 日到 18 日，一年一度的联合国气候峰会在马拉喀什召开。特朗普赢得总统竞选的消息一传到这里，美国政府代表团立即单独召开会议。现在其他国家的谈判代表和观察员都将希望寄托在奥巴马身上，希望他能够在明年 1 月份离任之前至少推动落实一部分过去 8 年所做出的承诺。

值得一提的是，推翻《清洁电力计划》可能并非易事。华盛顿方面的专家表示，这样的举动很有可能会遭受挑战，而且耗时 1 年以上。而从全球角度来看，其他国家可能并不怎么关注《清洁电力计划》，因为这最多算是美国国内的一项环保举措。

如果特朗普真的宣布美国退出《巴黎气候协定》，那才是全球对抗气候变化行动的最大退步。从法律的角度来说，特朗普这么做的难度可能会小一点，因为美国是根据奥巴马总统的行政命令才承诺参与上述《协定》的，而作为新任总统，特朗普完全可以撤销这个命令。或者，他还可能将该《协定》提交参议院审议，他知道该动议多半会被共和党参议员驳回。

乔治·W·布什政府拒绝签署《京都议定书》后，其他发达国家的产业界向政府表示，任何限制排放的政策都将减弱他们对美国的竞争力。与此同时，发展中国家的产业界也向政府谏言，认为自己国家不应该采取气候行动，因为毕竟作为曾经全球第一大温室气体排放国的美国也没有进行减排。（注：美国目前是仅次于中国的全球第二大温室气体排放国。）布什政府的决定导致全球温室气体减排行动落后了好多年。

特朗普可能对气候变化造成哪些威胁？

科学研究已经证明，要想将全球平均温度上升控制在 1.5℃范围内，全球温室气体排放就必须在 2020 年达到峰值。我们已经没有时间重开新一轮的气候辩论了。

其次，富裕国家承诺在 2020 年前每年向贫穷国家支付 1000 亿美元（约合 6780 亿人民币）的援助资金，帮助他们进行低碳转型，应对气候变化带来的各种影响。如果富裕国家失信，那么《巴黎气候协定》也就根本无法发挥效用。2009 年哥本哈根气候峰会期间，时任美国国务卿的希拉里·克林顿做出了上述 1000 亿美元的资金承诺。如果特朗普因与这位竞选对手的交恶而迁怒于这一承诺，那么《巴黎气候协定》恐怕要就此陷入困境了。

至于美国国内，美国分析人士预测，由于特朗普政府很可能背弃前任政府的气候承诺，所以未来一段时间估计也将面临环境组织一系列的法庭指控。为了避免这一状况出现，另有分析人士认为特朗普可

能会被建议通过“不作为”的方式来遏制绿色经济转型——比如推迟相关行政命令出台，或者干脆就不发布这样的命令。此外，相较废除环境保护署，特朗普更有可能会任命一位负责人来抑制该部门发展，并削减对该部门的财政支持，从而使其无法有效发挥作用。

不过也有环保人士认为，特朗普政府并不能完全阻碍美国绿色经济转型的进程，因为大多数的环保行动其实都是各州政府发起的。但是这一点并不能让其他国家放心，因为毕竟跟他们打交道的始终都是美国政府。

中国：全球气候行动新的领导者？

过去这些年，发展中国家在控制温室气体排放方面付出了比工业化国家更多的努力。中国目前已经在太阳能光伏电池板、风力发电设备等全球主要环保产品市场上占据了最大的份额。

当特朗普胜选的消息传来，中国著名气候问题专家杨富强表示，现在是制定出“一带一路”战略的中国引领全球气候行动的时候了。如果南亚、东南亚和中亚地区能够对中国“一带一路”的战略意图予以更多信任的话，那么这个观点就能引起上述很多地区的共鸣。

如果美国现在真的不再为发展中国家提供绿色经济转型所需的各种财政和技术扶持，那么其中许多国家将不得不向中国求助。

此前，印度已经与美国签订了一个大型太阳能双边合作计划。印度官员表示不希望该项目出现变动，但是他们希望等到美方相关政府部门人员调整之后再做最终评论。

美国环保界如何评价大选结果

多数美国环保人士都对本次选举的结果感到失望。行动援助组织政策分析师凯利·斯通认为：“气候变化已经对美国乃至全球数以百万计的人们的生活造成了巨大影响。干旱、洪水和其他各类极端天气变得越来越常见，后果也越来越严重，美国也难以幸免。这是当选总统特朗普必须要面对的一个全球性危机。”

国际环境法中心总监卡罗尔·马菲特则表示：“最终签署和批准《巴黎气候协定》的是美国这个国家，不是总统本人。从国际法角度来看，甚至从全人类的生存角度考虑，全球各国都可以、必须而且肯定会确保美国继续遵守其气候承诺。”

如今，中国和多个新兴经济体国家已经在全球绿色增长方面占据了领导地位。任何企图复兴美国化石能源经济的行为都可能给特朗普政府带来麻烦，这不仅会导致美国丧失国际影响力，还可能招致巨大的经济损失。

美国气候行动网络策略总监蒂娜·约翰逊表示：“其实当选总统特朗普还有机会采取进一步的气候行动，向投资者表明美国将继续可再生能源转型的发展道路。中国、印度和其他竞争对手国都在竞相角逐清洁能源超级大国地位，美国肯定也是不甘落后。”

即便特朗普试图推翻奥巴马任内所取得的气候成就，他也要面对经济现状和民间社会的积极抵制。

特里·塔米宁曾在共和党人阿诺德·施瓦辛格担任加州州长期间主导完成了该州具有开创性意义的气候立法。而他认为，特朗普的许多承诺可能都无法实现，比如钢铁行业不会在匹兹堡重现辉煌，而煤炭复兴也意义不大，因为美国的火力发电厂早已开始大规模使用天然气。

除此之外，共和党占多数的国会结构导致华盛顿政府的政治行动力陷入瘫痪，所以采取气候行动的权力其实已经下放到了各州、各地市以及行业内部。而且投资者们也明白，全球经济去碳化才是未来的发展方向。

气候变化机构投资者集团首席执行官斯蒂芬妮·法菲尔表示：“全球经济已经经历了不可逆转的变迁，而这种变迁的速度和规模令人惊叹：比如，可再生能源已经取代煤炭成为了全球主要的电力来源，电动汽车的市场份额迅速攀升，而清洁能源领域的就业机会也出现了前所未有的增长。此外，这种转变在美国经济中也变得越来越突出，即便在德克萨斯州这样的石油与天然气重镇，可再生能源投资的日益增加也创造了巨大的就业市场。”

乔伊迪普·格普塔，中外对话第三极项目南亚总监

Trump may spell disaster for climate

If Donald Trump continues to deny climate change once he takes office, the US will jeopardise the fragile international effort to green the global economy

□ Joydeep Gupta

President-elect Donald Trump believed climate change is a "hoax" invented by the Chinese

The election of Donald Trump may prove a disaster for the climate and especially for climate change negotiations if he sticks to the threats made during his campaign. But it may provide the developing world – especially China – with an opportunity to take on the role of leader in the fight against climate change.

If Trump's campaign trail promises come true then on his first day in office, the new President may rescind Barack

> China has the largest share in the global market for solar cells and wind farm equipment.

Obama's Clean Power Plan, withdraw the US from the Paris Climate Agreement, "end the war on coal" and cut funding for renewables.

As news of Trump's victory reached Marrakech – the city hosting the November 7-18 UN climate summit – US government delegates reportedly went into a huddle. Negotiators and observers from other countries are now pinning their hopes on Obama being able to push through at least some of the promises his government has made over the past eight years before he leaves office in January.

Overturning the Clean Power Plan may not be easy. The move would likely be challenged and the case could drag on for over a year, according to experts in Washington. For the rest of the world though, the Clean Power Plan is the part that concerns people the least, as it is mostly a domestic effort.

The biggest setback to the global fight against climate change will be if Trump actually withdraws the US from the Paris Agreement. Legally, he may find it easier to do this because the US promise to be a part of the agreement is based on an executive order by Obama. As the next president, Trump could withdraw that order. Or he may seek ratification from the Senate, knowing that a motion to enter the agreement would likely be defeated by Republican senators.

The decision by the US under George W Bush's administration not to ratify the Kyoto Protocol set back global efforts to control greenhouse gas (GHG) emissions by years. Governments in other developed countries were told by their industries that any action to control emissions would make them uncompetitive with the US. Meanwhile, developing countries were told by their industries that they should do nothing because the US – historically the world's largest emitter of GHGs, and still second today after China – was doing nothing.

Now there may be a repeat, only worse

The scientific evidence is clear that global GHG emissions must peak by 2020 if the global average temperature rise is to be kept within 1.5 degrees Celsius. There is simply no time left to reopen the climate denialism debate all over again.

Secondly, the Paris Agreement will not work if rich nations fail to keep their commitment to provide poor nations with US$100 billion (678 billion yuan) a year by 2020 to help the low carbon transition and to handle the impacts of climate change. The US$100 billion figure was given by Hillary Clinton during the 2009 Copenhagen climate summit, when she was Obama's secretary of state. If Trump's animosity towards the candidate he defeated extends to breaking this promise, the Paris Agreement will be in serious jeopardy.

Domestically, some US analysts foresee an era of lawsuits as environmental groups take the Trump administration to court over its expected failure to keep the promises made by his predecessor. To avoid this, other analysts predict that Trump will be advised to kill any moves towards a greener economy through inaction rather than action – by delaying executive orders or not making them. Rather than abolish the Environmental Protection Agency, Trump could appoint someone to head it that would stifle it and ensure its funding is cut so that it can no longer function effectively.

Some environmentalists feel that initiatives towards greening the US economy cannot really be stopped by a Trump administration because most of the initiatives are by state governments. But that is little comfort to the rest of the world, which has to deal with the federal government.

Power tilt

Over the last few years, developing countries have been making relatively greater efforts than industrialised countries to control GHG emissions. China already has the largest share in the global market for key green products, such as solar photovoltaic cells and wind farm equipment.

As news of Trump's victory came in, Yang Fuqiang, prominent Chinese climate expert, said this was time for his country to take over the global climate leadership under itsOne Belt One Road (OBOR) initiative. Such a sentiment would resonate more in large parts of south, south-east and central Asia if there was more trust in China's intentions behind the OBOR initiative.

But be that as it may, if the US now fails to provide finance or technology transfers under attractive terms to developing countries to enable them to move towards a greener economy, many of them will have no choice but to look towards China.

India has a large bilateral solar energy programme with the US. Indian officials said they did not expect any change to that, but they would wait and watch for any personnel changes in the relevant departments in the US government before saying anything more.

Environmentalists' reactions

Most American environmentalists were dismayed by the election result. Kelly Stone, a policy analyst at ActionAid, said, "Climate change is already having major impacts on the lives of millions of people in the United States and around the world. Droughts, flooding and other types of extreme weather events are becoming stronger and more frequent, and the US is not immune. This is a global crisis that President-elect Trump will have to address."

Carroll Muffett, president of the Centre for International Environmental Law, said, "The Paris Agreement was signed and ratified not by a President, but by the United States itself. As a matter of international law, and as a matter of human survival, the nations of the world can, must, and will hold the United States to its climate commitments."

Any attempt to revive the fossil economy in the US could also pose a risk for Trump, leading not only to a loss of international influence but also economic damage as China and emerging economies take the lead in global green growth.

Tina Johnson, policy director for US Climate Action Network, said, "President-elect Trump has the opportunity to catalyse further action on climate that sends a clear signal to investors to keep the transition to a renewable-powered economy on track. China, India, and other economic competitors are racing to be the global clean energy superpower, and the US doesn't want to be left behind."

Even if Trump attempts to roll-back the progress made under Obama's tenure, he will struggle against economic realities and a vibrant civil society.

Terry Tamminem, who designed California's groundbreaking climate legislation under the republican governor Arnold Schwarzenegger, believes that many of Trump's promises cannot be fulfilled. He said that steel is unlikely to return to Pittsburgh, for example, and a revival for coal would make no sense given that US power plants are already converting to natural gas.

Furthermore, the paralysis in Washington politics caused by the Republican dominated Congress means that action on climate change has already devolved to states, cities and business. And investors understand that the global economy must decarbonise.

Stephanie Pfeifer, CEO of the Institutional Investors Group on Climate Change, said, "The pace and scale of change already underway in the global economy is remarkable and irreversible: for instance, renewables have already overtaken coal as a global power source, electric vehicles are the growth segment of the auto industry and jobs are being created in clean energy sectors faster than any other. Moreover, this shift is already highly visible in the US economy, where major new investment in renewables is driving significant job creation in places like Texas, the heartland of oil and gas."

Joydeep Gupta is South Asia director of The Third Pole.

特朗普当选或将中国推向气候行动领导地位

中美气候合作在奥巴马执政时期走向高峰，但随着特朗普的当选，中国或将担起推动气候行动的重任。

□ 沈·岱波

中美在建立相互信任和气候合作上做出了努力，图为2013年奥巴马与习近平在加利福尼亚的会晤

美国即将迎来一个与本届政府截然不同的领导班子，我们将可能目睹同一国政府在气候变化议题上态度的转弯。当前景况不明晰，让我们一道回顾过去八年奥巴马任期内中美两国在气候变化领域取得了哪些重大合作进展。的确，正是在奥巴马的任期内，中美两国在气候谈判中的关系从竞争者和对立者演变成了关键的合作伙伴。去年12月，两国更是推动各国就突破性的《巴黎协定》达成共识。奥巴马总统和习近平主席在2014年11月和2015年9月进行了两次重要会晤，先后达成了两份中美气候变化联合声明。这两份联合声明为全球两个最大的碳排放国通力合作、推动巴黎大会达成有效的气候协议奠定了基础。

当然，《巴黎协定》是多方努力的成果，其达成离不开法国时任外交部长、巴黎气候变化大会主席法比尤斯和《联合国气候变化框架公约》（UNFCCC）秘书处高超的协商

技巧。但若是没有中美这两个大国达成共识，这样的协议根本不可能达成。此外，习近平和奥巴马在会议之初特地承诺将通力合作，并明确表示谈判进行到关键时刻无法抉择时，可以破例直接和国家元首进行咨商（对于办事按规定来的中国，这一举动非常少见）。

但事情并非一直是这样。奥巴马总统上台时，民众热烈期待美国会马上转变自身在气候变化方面的立场，加深与中国的合作，一同在2009年哥本哈根气候大会上促成各国达成突破性协议，然而这让他们等了足足11个月。就在会议召开前几周，中美两国相隔一天先后公布类似的排放控制目标，会议前景一片大好。但受国内政治掣肘，总统支持的瓦克斯曼 - 马基气候法案未能获得国会批准。而华盛顿方面的谈判代表不知道中国国务院在会前确定的谈判立场令哥本哈根大会上的中国谈判者拥有极少的回旋余地。这一切造成了两国代表团的针锋相对、公开叫板，由此形成的嫌隙直到多年后才得以化解。

外交新篇章

但我们必须给两国以应有的信赖。气候变化对于两国领导人的重要性毋庸置疑，这些年来双方也在努力修复两国之间的关系。幸运的是，两国在实践层面的双边合作有着坚实的基础，涉及领域从气候科学到能源效率，再到克林顿政府第一任期内就开始的可再生能源开发。可能略带讽刺的是，尽管小布什政府拒绝签署《京都议定书》，两国在工作层面的合作并未终止，在碳捕集、利用与封存（CCUS）以及甲烷捕获等领域的合作甚至有了加强。但奥巴马政府带来的是新的活力，和对建立两国从政策到技术的合作关系的真正的兴趣。

奥巴马总统任命的两任国务卿希拉里·克林顿以及约翰·克里都曾致力于推动《巴黎协定》的达成。哥本哈根气候会议期间，希拉里曾提前飞抵主办地，试图抢救两国之间的关系，而克里本身就是美国参议院抗击气候变化行动的领导者，任国务卿期间更是将此作为自己的首要工作。尽管如此，两国早期的行动还是建立更深层次的技术合作关系。1992年两国开始开展技术合作，而从这一年开始，中国的国际地位也发生了根本性的变化。美国时任能源部长、诺贝尔物理奖获得者朱棣文提出两国应更多地关注合作创新，并与同样注重技术发展的中国科技部部长、前奥迪公司高管万钢一拍即合，促成了一项重大的联合行动，建立了中美清洁能源联合研究中心 (CERC)。

成立之初，中心下设建筑能效、清洁能源汽车、以及清洁煤三个联盟。每个联盟都有两国公共及私营财团的参与，合作开发致力于两国共同利益的研究项目。研究中心通过共同开展具体的研发项目，推动清洁能源的创新。项目开展的前五年，中心取得了数十个重要的研究成果，并主持开展示范项目，向市场投放了15个新产品。两国估计，到2025年，研究的成果将每年减少2.75亿吨二氧化碳的排放。朱棣文卸任后，同样是研究型的欧内斯特·莫尼兹接任能源部部长一职，联合研究中心的发展进入第二阶段，并分别于2014年和2015年增加了能源与水、中型和重型卡车能效两个新的研究领域。

从可再生能源到大气科学等各个方面，这些新的研究领域拓宽了中心的项目种类，也令该中心成为中美两国多种多样的合作的基础框架。鉴于两国在商业与学术领域有着深厚的联系，政府间合作向来都只是两国互动的一部分。近年来，一些主要非政府组织也发挥了重要作用。这些群体虽然仍旧有各自独立的项目，但他们同样可以在联合研究中心的架构内展开合作。

国内变革

这些项目建立的稳健的合作关系为改善两国外交关系奠定了基础。哥本哈根大会确实是一大挑战，但次年各国便再次齐聚坎昆，消除分歧，达成了初步的草案。这个过程

> 中国专家曾表示，美国新政府不能对巴黎协定放手不管。即使在特朗普还没获胜的时候，情况已经在改变了：国际气候谈判中更需要被人推着走的已经不再是中国，而是美国。

中，中美两国更是通力合作，丝毫不受之前积怨的影响。此外，2011 年德班气候大会召开，通往巴黎气候大会的道路最终铺平，中美两国也发现，彼此在气候谈判越来越多地处于同一战线中。

两国国内的情况也在发生变化。尤其是中国“十一五”规划（2006-2010）的成果有目共睹，全球普遍认为中国在降低能源强度方面取得了极大进步。由此，所有了解情况的人都明白，哥本哈根气候会议上的一个主要问题——中国能否履行承诺，已经不再是问题。与此同时，2013 年，奥巴马进入第二届任期，决心不顾国会的不作为，大力加强对温室气体排放的控制。最终，《清洁电力计划》于 2014 年 7 月首度揭开面纱。

美国人常常在许多方面质疑中国履行承诺的能力，但鉴于美国拒绝签署《京都议定书》，制定联邦排放控制计划更是耗时多年，从很多方面看，美国才是一个更大的不确定因素。但奥巴马总统成功说服习近平主席相信自己对《清洁电力计划》的承诺，两国也得以在 2014 年 11 月达成了气候联合声明。该联合声明包括《清洁电力计划》以及车辆排放控制和能效措施。该声明也是中国首次在国际上公开承诺在 2030 年之前达到碳排放峰值。2015 年 9 月联合声明的目标则更加远大，其中两国不仅承诺出台具体的减排方案（包括中国将于 2017 年启动全国性碳交易市场的计划），还许诺将各自拨款 30 亿美元（约 200 亿元人民币）用于发展绿色金融，并明确提出将合作促成当年 12 月的巴黎气候大会取得圆满成果。

奥巴马的政治遗产

奥巴马在气候变化领域的政治业绩远未达到他所期望。显然，他本希望能够看到温室气体减排立法获得联邦通过。虽然未能如愿，但他已经通过行政命令和行政立法推行了一些重要的温室气体控制措施，并且确保了新的气候行动国际协议得以达成。全球最大的两个排放国之间的相互信任和理解是成功达成《巴黎协定》的关键所在。过去八年间，两国关系发生了诸多变化。美国方面开始意识到自己可以在双方合作中学到很多，而和中国一样，美国同样需要来自对方的压力来实现自己的承诺。

一个坚决拒绝面对气候变化的美国政府即将登上舞台。的确，唐纳德·特朗普曾经把气候变化称作“中国骗局”。有趣的是，二十年前很多中国人也曾有过同样的怀疑：是西方国家发明了气候变化的说法，作为限制发展中国家经济增长的手段。现在这个观念在中国已经不再流行，但在其他发展中国家还能偶尔听到。现在的中国民众对气候变化的实际风险，特别是低碳减排和防治空气污染之间的联系，已经有了切身的体会。特朗普的“中国骗局”一说因而显得实在荒谬。

的确，中国气候变化事务特别代表解振华和谈判专家邹骥都在近期公开表示过，美国新政府不能对巴黎协定放手不管。即使在特朗普还没获胜的时候，情况已经在改变了：国际气候谈判中更需要被人推着走的已经不再是中国，而是美国。可以说，气候变化不仅不是中国骗局，正相反，来自中国的诚意也许是我们拯救气候的最大希望。

沈·岱波，在美国加州大学圣地亚哥分校研究环境治理，主要关注中国和印度的空气污染管制

Trump may force climate leadership on China

China-US climate cooperation blossomed under Obama, but under Trump it'll likely be China doing the pushing

□ Debora Seligsohn

As we face the prospect of a very different US administration, with seemingly antithetical priorities on climate change, it is worth reflecting on what we have gained over the last eight years and what we risk losing.

Indeed, during the Obama administration the United States and China have evolved from competitors and opponents in climate negotiations to vital partners that together helped form the consensus for the breakthrough Paris Accord a year ago in December.Two critical meetings between Presidents Obama and Xi in November of 2014 and September of 2015, resulted first in the 2014 joint announcement and then an even more coordinated joint statement in 2015. These set the stage for the world's largest two carbon emitters to coordinate in pushing through an effective agreement in Paris.

The Paris Agreement, of course, was the result of many parties' hard work, and the negotiating skill of the French Chair and the UNFCCC Secretariat, but without the shared commitment of the largest players in the room, the agreement would have been impossible. Moreover, the two presidents went out of their way at the beginning of the meeting to demonstrate their commitment to cooperation and to make it clear (in a very unusual move for the Chinese with their protocol-laden system) that they were available for consultation with their respective delegations when the negotiations got down to the final difficult hours.

It wasn't always this way. When President Obama came into office expectations were high that the US would shift its position on climate change in ways that would lead both to greater US-China cooperation and to a global breakthrough agreement in Copenhagen in 2009, not quite 11 months after the new President took office. Even a few weeks before the Copenhagen meeting prospects were promising as the two countries announced parallel emissions control targets just one day apart. But the US was hamstrung by domestic politics with the President unable to gain approval for his favoured climate legislation, Waxman-Markey. Washington's climate negotiators also did not understand the constraints Chinese negotiators were under at Copenhagen. They had little room to move from a position the State Council had approved prior to the meeting. The net result was a series of very public, angry exchanges between the two delegations and bad blood that took years to recover from.

New era of diplomacy

But we need to hand it to both countries. The importance of climate change to both the US President and the Chinese leadership was never in doubt, and both sides worked hard over the years to repair the relationship. They were fortunate to already have a strong basis in bilateral cooperation on the very practical level; on everything from climate science to energy efficiency to renewable energy development that had begun in the first Clinton administration. Perhaps ironically, despite administration of George W Bush's repudiation of the Kyoto Protocol, the working level cooperation had continued, and in some areas, such as carbon capture, use and storage (CCUS) and methane capture, even been strengthened. But the Obama administration came in

with renewed energy and a real interest in building the relationship from high-level policy to joint technology development.

While both of President Obama's Secretaries of State, Clinton and Kerry, were committed to the process that led to the Paris Agreement, with Clinton flying in early to try to salvage the relationship in Copenhagen, and Kerry, already a leader in the Senate on climate change, focusing on it as a top priority as Secretary, the early move was a deeper technology relationship. China's own position in the world had changed radically since 1992, when the process began, and Nobel Laureate and US Energy Secretary Steven Chu brought to the table a view much more focused on cooperative innovation. He found an equally interested partner in China's technology-focused Minister of Science and Technology Wan Gang, a former Audi executive. This led to a major joint initiative, the US-China Clean Energy Research Center (CERC).

Originally three centres were planned in the first phase, focused on building efficiency, clean vehicles, and advanced coal technologies with CCUS. Each centre involves consortia of public and private partners from each country that work together on research projects of mutual interest. The CERCs have promoted clean energy innovation through specific joint research and development projects. In the programme's first five years the centres produced dozens of important research results, as well as running demonstration projects and launching 15 new products on the market. The two countries estimated that the outcome of this research would result in a reduction of 275 million tonnes of carbon dioxide per year by 2025. As Secretary Chu was replaced by the equally research-oriented Secretary Ernest Moniz, the CERCs entered their second phase, adding a fourth track on energy and water in 2014, and a fifth on improving the energy efficiency of medium-duty to heavy-duty trucks in 2015.

The CERCs augmented robust programmes in everything from renewable energy to atmospheric science. They also helped integrate the many facets of Sino-US cooperation. Government-to-government cooperation had always been but one piece of the interaction between the two countries, given the size of the business and academic relationships between them. Moreover, in recent years, non-governmental organisations have also played a large part. All of these spheres continue to have independent projects, but within the CERC they also work together.

> "Americans have often questioned China's ability to deliver but, in many ways, the US has been a much larger question mark."

Change at home

This robust interaction on practical projects provided the basis for improving the diplomatic relationship. While Copenhagen was a challenge, the world came together again the following year at Cancun to iron out that very preliminary agreement, and the two countries worked together with none of the rancour visible the previous year. Moreover, by 2011 in Durban, when the pathway to Paris was established, China and the US often found themselves on the same side in negotiations.

The domestic picture in each country was also changing. In particular, Chinese achievements under the 11th Five Year Plan (2006-2010) had become visible to all, and it was widely acknowledged that the Chinese were making significant strides in reducing energy intensity. Thus, what had been a major question at Copenhagen – could the Chinese honour their commitments – no longer was, at least among those who were well-informed. At the same time, President Obama entered his second term in 2013 determined to make headway in controlling greenhouse gases, despite the failure of Congress to act. The result was the President's Clean Power Plan, first unveiled in July 2014.

Americans have often questioned China's ability to deliver but, in many ways, the US has been a much larger question mark, given the US withdrawal from the Kyoto Protocol and the many years it took to enact any federal emissions control programme. But President Obama persuaded President Xi of his commitment to the Clean Power Plan, and the two were able to agree on a joint announcement in November 2014. The joint announcement included the Clean Power Plan, as well as vehicle emissions controls and efficiency measures. It also marked the first time China made a public international commitment to peak carbon emissions by 2030. The Joint Statement in September 2015was considerably more ambitious. Not only did it include commitments to cutting emissions in each country, it also included the launch of a Chinese cap

and trade program in 2017, pledges of approximately US$3 billion (20 billion yuan) each for green finance, and specific commitments to working together to make the Paris meeting last December a success.

Obama's legacy

President Obama's legacy on climate change is hardly all that he had wished. He clearly wanted to see national legislation to limit greenhouse gas (GHG) emissions. He implemented a number of critical GHG controls through executive orders and administrative rule-making, and he succeeded in helping shepherd in a new international agreement. Critical to the successful Paris Agreement was the level of trust and mutual understanding between the two largest emitters. The relationship changed over the course of the past eight years with US stakeholders coming to realise the enormous value of collaboration, and with the US in need of pressure from China to keep its commitments at least as much as China is from the US.

We now face the prospect of a radically rejectionist administration. Indeed, Donald Trump has called climate change a "Chinese hoax," a rather odd formulation especially since twenty years ago there were many in China who wondered if the opposite wasn't true – that climate change was a scheme by the West to keep the developing world from developing. This view is relatively rare in China today, but one still hears it elsewhere in the developing world.

The Chinese, though, seem to really understand the risk of climate impacts and the links between protecting the climate and addressing their terrible air pollution problems. In recent weeks, both China's Climate Minister Xie Zhenhua and one of his top advisors, Zou Ji, have publicly warned the US that it should not abrogate the Paris Agreement. Both were directly critical of Trump's position. Even before the Trump victory, it was becoming clear that the tables had turned to some extent; that the US, rather than China, might be the player that needs to be pushed in the international process. That will certainly be the case now. Not only is climate change no Chinese hoax, but Chinese seriousness may be our best hope.

Deborah Seligsohn researches environmental governance at the University of California at San Diego, focusing specifically on air pollution regulation in China and India.

如何看待美国环保署易主?

斯科特·普鲁易特将成为美国下任环境保护署署长。当选总统特朗普的这一任命引发了人们对美国气候行动遭到削弱的担忧。我们就美国政坛这一动作的国内和国际影响采访了五位专家。

□ 中外对话

唐纳德·特朗普是作为一个政治门外汉参加总统竞选的，那时他的承诺是要彻底扫除华盛顿的旧势力。现在看来，斯科特·普鲁易特（Scott Pruitt）的任命证实他是和化石燃料行业和污染者一伙的。普鲁易特上任后很可能会阻碍美国环境保护署（Environmental Protection Agency，简称 EPA）履行职责，其执法能力或将遭到削弱。

此前美国联邦政府曾承诺在2020 年前进行下一轮减排，而目前来看这方面的准备工作也许会暂时搁置。联邦政府应该不会在 2018 年协议审议期间推出新的方案，所以这个重任可能就要交给美国各市、各州和商业领域的相关人士了。所以，很明显，即便特朗普政府号称希望下一轮审议期内美国的排放量能够上升，实际排放仍将维持下滑的趋势。唐纳德·特朗普无法阻挡这一趋势——当美国商界、各市各州决定从经济和健康角度出发进行减排的时候，特朗普是不可能扭转趋势的。特朗普可能会说很多大话，但是至少在二氧化碳方面不会产生太大影响。

美国国家环境保护局新掌门人斯科特·普鲁易特

芭芭拉·费楠茉　自然资源保护协会高级律师兼亚洲总监

特朗普任命斯科特·普鲁易特只会更加坚定全美乃至全世界对抗气候变化的决心。正如我在自然资源保护协会（Natural REsources Defense Council，简称 NRDC）的同事陈晗从马拉喀什发回的文章所说的那样：“《巴黎气候协定》的一份宝贵的遗产是它在各个国家、城市、州、商业领域和民间社区掀起了一股气候行动浪潮。这股浪潮用联合国秘书长潘基文的话来说，是‘不可阻挡’的。”

如今，中国正逐步成长为全球气候变化方面名副其实的领导力量。因为中国认识到，完成从化石燃料到可再生能源的转型将在可再生能源、电动汽车和节能产业创造更多的就业机会，从而确保其经济长期发展；能够帮助其对抗长期以来的环境污染；保障粮食安全、人类健

康、城市发展和基础设施免受气候变化带来的破坏性影响。

一次又一次的民调显示，绝大多数的美国人也希望本国领导人能够采取果断措施遏制碳污染，带领美国进入一个繁荣的清洁能源经济时代。忽视全美人民的意愿和地球面临的巨大威胁只会让美国变成全球气候领域令人唾弃的对象，由此带来的全面影响不堪设想。

沈·岱波　加州大学圣地亚哥分校环境治理研究员

中美气候关系既包括联合行动，也有同时在各自的国内履约行动。美国环境保护署（EPA）的主要任务就是落实美国国内环保政策，而下任署长斯科特·普鲁易特的上台则引发了广泛担忧。普鲁易特曾明确表示反对奥巴马总统的《清洁电力计划》。而该《计划》恰好是美国在《中美气候变化联合声明（2015）》和《巴黎气候协定（2015）》中的重要贡献所在。

气候谈判本身属于美国国务院职能范围内的工作，由美国国务卿领导，但从日常角度来看，该项工作更多是由美国国务院内部的气候谈判代表负责。所以我们还要等等看特朗普对这两个重要位置人选的任命。但是不管怎么说，如果美国环境保护署（EPA）不能承诺落实国内环保政策，恐怕美国对外也不会有什么积极贡献了。

此外，美国环境保护署在提升中国环境表现方面也有着重要作用。美国环境保护署已经为中国提供了很多低成本、高价值的技术支持，涉及空气污染监控、有毒化学品管理等多个方面。如果美国环境保护署的权力被弱化，那么不仅对中国的支持力度会减弱，对目前正开始逐步感受到治理环境污染带来各种挑战的印度及其他发展中国家来说，也是如此。

这些获得提名的新内阁成员可能大多不知道，美国环境保护署和美国其他技术与监管机构一直倍受中国人的推崇。这些机构为面临健康和安全问题的发展中国家提供了优选的治理模型。如果美国政府选择减少此类监管服务输出，则可能对美国软实力输出形成严重影响。

卡洛斯·瑞多　气候观察站执行秘书。气候观察站是由40多家巴西民间团体结成的联盟。

斯科特·普鲁易特被任命为美国环境保护署署长并不算是一个意外，却实在是一个倒退。环境保护署本应是一个以科学为指导的机构，而让一个科学否定者担任其负责人，这实在是荒唐。不过，普鲁易特和特朗普内阁也不能因此便为所欲为。气候行动议程并不是由总统说了算的。如果各个州长、市长和商业领袖决定沿着既定的方向继续前行，那么美国联邦政府气候政策变化的影响也将非常有限。

中国及其他主要经济体将会继续加大清洁能源领域投资，抢占美国留下或错过的市场缺口。比如，包括德国、中国和挪威在内的多个国家就已经与巴西在气候方面展开了密切合作。

不管谁来担任美国总统或者由谁执掌美国环境保护署，气候变化都在发生。也许特朗普能阻止美国政府采取行动应对气候变化，但是他无法阻止加州下一个森林火灾季节的来临，或者任何一个侵袭美国东海岸的飓风。

尼克·梅比 E3G首席执行官兼创始董事

当选总统特朗普任命斯科特·普鲁易特的行为说明他在竞选前后还真是“言行一致”。普鲁易特不仅是一个环境变化怀疑论者，同时还对现有环境科学和联邦政府依法保护公众环境的行为提出了多次严重质疑。

选择了这样一个极端的候选人，特朗普总统恐怕未来在参议院听证会上也不会好过，而且很有可能在法庭上遭到环保组织的强烈抵制。此前也曾出现过类似的状况，只不过可能没有这么极端。纽特·金里奇（Newt Gingrich）和乔治·W·布什就曾试图削弱美国环境保护署的权利，最终以退让悻悻收场。

美国环境保护署的不少条例多年来一直得到法院的支持和认可，在没有提供新的证据证明这些条例无效的情况下，想要瓦解它们是非常困难的。而如果不能落实现有政策条规则，环境保护署则会面临不少法律挑战。

斯科特·普鲁易特曾经对美国环境保护署提起诉讼，反对其出台的限制电力部门温室气体排放的法规。美国大多数的州都将清洁能源看作是增加就业机会和扩大出口的机会。而普鲁易特反对上述条规的做法则让他站在了美国大多数州的对立面。如果《清洁电力计划》被削弱或废除，那么如今快速发展的清洁能源领域将会受到巨大的不确定因素的冲击。

Do EPA changes matter for climate?

chinadialogue asks experts what a US environmental policy shift could mean for international efforts to address climate change

□ chinadialogue

President-elect Trump's decision to appoint Scott Pruitt as administrator of the US Environmental Protection Agency (EPA) has raised concerns about a weakening of US climate action. We asked experts what the US and global implications could be.

Carl Pope, principal advisor at Inside Straight Strategies and former executive director and chairman of the Sierra Club

By appointing Scott Pruitt, Donald Trump has convincingly demonstrated that while he ran as an outsider, promising to drain the swamp in Washington, he will govern as a kept creature of fossil fuel interests and polluters. Under Pruitt, the EPA will be blocked from carrying out its duties and enforcement will wither.

Yet on carbon dioxide emissions US progress will continue because previous regulatory action and market prices are driving utilities towards renewables at an accelerating rate. Emission standards for vehicles are largely baked in by previous investments and decisions, and by the fact that California and the states allied with it will not permit a roll-back of emission rules. So the US will largely comply with its Paris obligations.

> "China is already emerging as the de facto world leader on climate change. It recognises that transitioning from fossil fuels to renewable energy will ensure its long-term economic development."

What will not happen at the federal level is the needed preparation for the next round of emission cuts to be pledged in 2020. Washington will not bring a new set of Nationally Determined Contributions to the 2018 review – that will be up to US cities, states and businesses to tee-up, so that in the next review round it will be clear that US emissions will drop even if the Trump Administration proclaims it wants them to increase. Donald Trump cannot stop the tide – and he cannot make US businesses, cities and states emit climate pollution that they have decided, for economic and health reasons, to curb. He may emit hot air, but not enough CO_2 to matter.

Barbara Finamore, senior attorney and Asia director at the Natural Resources Defense Council

Trump's appointment of Scott Pruitt will only strengthen the widespread determination that exists to combat climate change in the US and around the globe. As my NRDC colleague Han Chen wrote from Marrakech: "That is part of the legacy of the Paris Agreement – creating a momentum for action among countries, cities, states, businesses, and communities that UN Secretary General Ban Ki Moon called 'unstoppable.'"

China is already emerging as the de facto world leader on climate change. It recognises that transitioning from fossil fuels to renewable energy will ensure its long-term economic development by creating jobs in new industries such as renewables, EVs and efficiency; combat its relentless pollution; and protect China from the devastating impacts of climate change on food security, human health, cities and infrastructure.

Poll after poll has shown that strong majorities of the American people also want our leaders to take decisive action to restrict carbon pollution and move us to a prosperous, clean-energy economy. Ignoring the will of the American people and the global threat to our planet will only turn the US into an international climate pariah, with serious consequences across the board.

Deborah Seligsohn, PhD candidate researching environmental governance at the University of California at San Diego

The US-China climate relationship involves both joint activity and the parallel implementation of domestic commitments. The EPA's major task is domestic implementation and here the appointment of Scott Pruitt as EPA Administrator raises concern. Pruitt is a prominent opponent of President Obama's Clean Power Plan, the cornerstone of the US contribution to the 2015 US-China Joint Statement on Climate Change and the 2015 Paris Climate Agreement.

Negotiations themselves are more the purview of the State Department, led by the Secretary of State, but on a day-to-day basis by the Climate Negotiator within the State Department. Thus, we will need to wait and see who is selected for these two critical positions, but without an EPA commitment to domestic implementation, it is hard to see what kind of a positive contribution the US can make.

Moreover, the EPA has been vital to the broader project of improving Chinese environmental performance. The EPA has provided low cost, but extremely high value,technical assistance to China on everything from air pollution monitoring to regulating toxic chemicals. If EPA is weakened it will become less of a resource not just for China but for other developing countries like India that are starting to face the challenge of regulating their polluted environments.

What many of those selected thus far for the new administration probably are unaware of is that the EPA and the US's other technical and regulatory agencies have long been admired by the Chinese. They have often offered the preferred model for regulation as developing countries face emerging health and safety problems. This is just one example of the type of soft power that the United States risks losing if it scales back its regulatory outreach.

Carlos Rittl, executive secretary of Climate Observatory, a network of 40 Brazilian civil society organisations

While the appointment of Scott Pruitt as head of EPA is not a surprise, it is a setback. It's really weird to have an agency that should be guided by science being led by a science denier. However, there are limits to what Pruitt and Trump's cabinet can do – or undo – on the climate agenda given that it's not an exclusive responsibility of the President. If governors, mayors and businesses decide to move ahead, this will set clear boundaries for the impacts of changes in US government policies.

China and other major economies will increase their investments in clean energy, occupying any gap left behind by the US. In the case of Brazil, other countries such as Germany, China and Norway have close collaboration with the country on the climate agenda.

Climate change doesn't care who the US president is or who runs the EPA. Trump can stop the US government acting on climate change. But he won't be able to stop California's next forest fire season or hurricane hitting the eastern coast.

Nick Mabey, chief executive and founding director of Third Generation Environmentalism (E3G)

The nomination of Scott Pruitt unfortunately shows that Trump's actions as President-elect are completely aligned with his campaign rhetoric. Pruitt is not just a climate change sceptic, but an active denier of both established environmental science and the federal right to protect the public through regulation.

However, picking such an extreme candidate means that President Trump will face stormy Senate confirmation hearings and a strong backlash from environmental groups in the courts. Similar – if less extreme – attempts by Newt Gingrich and George W Bush to roll back EPA powers ended in humiliating climb downs.

It will be extremely hard to unpick the many EPA rules that have already been upheld by the courts without providing new evidence of why they are unnecessary. Failure to enforce existing rules will open up the EPA to legal challenges.

Scott Pruitt led the law suits from the states that objected to EPA rules limiting greenhouse gas emissions from the power sector. By attacking these regulations he will find himself on the end of similar challenges from the many US States who see clean energy as a source of good jobs and new export opportunities. Rapidly growing green sectors will be hit by significant uncertainty if the Clean Power Plan is watered down or revoked.

保护地球急需新国际法庭

律师兼活动家斯蒂芬·霍克曼倡导建立一个新的全球性环境法庭，来大力促进遏制污染和气候变化的活动。

□ 中外对话

伦敦律师斯蒂芬·霍克曼是国际环境法庭联合会的主席，这个组织旨在推动建立一个新的国际法院专门对有关气候变化和环境退化的问题进行裁决。在霍克曼看来，这是一个增强环境公正的途径，与国际刑事法院正在影响全球人权规范的方式类似。他在接受中外对话采访时说，这能填补国际法条的空白，对于那些国内法律体系薄弱或者资源不足国家的活动者来说尤为可贵。

中外对话（以下简称“中”）：我们为什么需要一个国际环境法庭？

斯蒂芬·霍克曼（以下简称“霍”）：环境没有国界，因此毫无疑问需要用国际方式来解决。

我们已经有一个非常发达的国际法体系，国际环境条约法框架以及某些用以执行法律条款的司法机制，而其中最重要的就是国际法院。

我们这些人能想到的问题就是国际环境法律和法庭系统的发展还远远不能满足需求。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国际法院似乎并不太愿意对国家间的环境争议进行判决，而是乐于审理那些具有明确管辖权的案件。何况在任何情况下，国际法院只能在接受其管辖权的国家间进行裁决。

因此，当我们2009年提出这一设想时，发现急需建立一个截然不同的机构。这个法庭不但能在国家间进行裁决，也能在国家与非政府组织或公司等非国家行为体之间审判；不但能适用国际环境法，只要恰当，也可以适用国内法；能够接受与出现的环境问题相关的非常详细的证据，并在需要的情况下对其进行核查，以及允许法庭成员对证据是否符合进行判断。

最重要的是，我们觉得需要这样一个法庭来更加主动地制定优先于法律的各项原则。

比如，工业活动中不可避免地要在收益和潜在不利因素间进行平衡。各个法庭都掌握了在国内语境下实现这一平衡的技巧，比如噪音、臭味或扬尘损害的案例中。但在国际层面，实现这一平衡的法学案例还非常少。

中：您能举个例子，说明这样一个法庭如何很好地为人们服务吗？

霍：举两个比较极端的例子，即尼日尔河三角洲和厄瓜多尔。这两个地方的问题都是由工业和采掘活动造成的，但其国家或市法院就连事后也无法作出应有的裁决，更不要说解决正在发生的问题了。这些案子让我们看到世界真的急需这样一个法律机构。

另一个假想的案例是在孟加拉国这样国内体制并不健全的国家附近发生漏油事故，也需要这样的法庭来追责，以及协调各方力量减少后续风险。你可能会将这个假想案例与墨西哥湾漏油事故进行比较，后者似乎已经在美国的法院得到了彻底解决。

中：它能发挥像美国国家环保局（EPA）那样的作用吗？不过是在全球层面上。

霍：像美国国家环保局这样的机构有一大特色，就是可以作为程序的一部分发挥作用，在某种形式的工业或商业活动发生环境影响时就介入其中，而非一定等到发生损害的时候才采取行动。它可以参与工业或商业活动过程，并进行调查和监督。

在目前没有任何有效国际环境机构的情况下，我们肯定需要探讨国际环境法庭在特定项目中发挥监督作用的可能性。如果尼日尔三角洲和厄瓜多尔的案例中，人们能够求助于某种形式的独立监督机构的话，那么这无疑会是一个非常宝贵的资源。

另外还有一个途径，就是与法庭同时建立一个单独的环境机构来执行监督职能。

中：这个法庭会不会存在合法性问题？

霍：我想这个问题会很大，而我们想出的解决办法可能会被称为“阶段性方式”。

我们设想的是，首先先建立某种形式的法庭，不必由联合国来设立，甚至不必得到任何国家政府的同意。其运作在很大程上是“事实性”的，将对那些提交到该法庭而又被认为可以裁决的案件进行受理、审理和判决。

如果我们的基本理念是正确的，由于其裁决方法和判决结果清晰明了且具有说服力，这样一个机构将发挥重要作用，随之逐渐证明自己。国际组织和主要国家会开始将其视为一个有“真材实料”的机构。

或许也会出现另一种结果。我们努力寻求建立国际环境法庭的过程将说服现有的机构接手这一工作，从而让我们的整个任务变得不再有必要。这种结果也是我们乐于见到的。

我们想要的就是能填补这一空白的机构。

中：这个倡议最近的势头是不是越来越好了，比如在2015年巴黎气候变化协定达成之后？

霍：尽管开头的时候反应大都很消极，但我们看到对这一想法的接受度越来越高，这也是一个必然逐渐产生的趋势。现在人们怀疑的是法庭能够多快成立，以及这一想法的实用性。

这和《巴黎协定》并没有直接联系，但我想，环境问题意识的不断增强，以及国际社会不断加大对环境问题解决方法的支持力度，都会对这一倡议有利。它的推动需要资源和更大的接受度。

斯蒂芬·霍克曼，皇室法律顾问，英国出庭律师公会以及环境法律基金会主席

New international court for planet

Lawyer and campaigner Stephen Hockman is advocating a new global environmental tribunal to escalate action against pollution and climate change

□ chinadialogue

London-based barrister Stephen Hockman is chairman of the International Court for the Environment (ICE) Coalition, which wants to see the creation of a new, specialist international tribunal to rule on cases involving climate change and environmental degradation. He sees it as strengthening environmental justice in a way similar to the way the International Criminal Court is starting to impact global norms on human rights. He tells *chinadialogue* it would plug a gap in provision, and be especially valuable for campaigners in countries where the domestic legal system is weak or poorly resourced.

chinadialogue (CD): Why do we need an International Court for the Environment?

Stephen Hockman (SH): The environment doesn't recognise national boundaries, so there's no question an international approach is required.

We already have a developed system of international law, a framework of international environmental treaty law and some judicial mechanisms through which it can be enforced, above all the International Court of Justice (ICJ).

The problem some of us have perceived is that international environmental law and the court system have not developed far enough to meet the need.

The ICJ has not always shown itself keen to adjudicate on the substantive merits of environmental disputes between states, tending sometimes to prefer to decide cases on jurisdictional or other similar grounds. In any case, the ICJ can only adjudicate on disputes between states that have accepted its jurisdiction.

So when we started thinking about this in 2009, we saw a crying need for a different sort of institution – one which would be able to adjudicate not only between states but also between states and non-state actors such as NGOs and corporations; which could apply international environmental law, or even domestic environmental law when that appeared to be the proper law; which could receive and, if necessary, examine in great detail evidence about the environmental problem that had arisen and allow the members of the court or tribunal to give a judgement, on the evidence, on compliance or non-compliance.

Above all, we saw the need for such a tribunal to develop the principles underlying the law more proactively.

For example, in the case of industrial activity, inevitably a balance has to be struck between benefits and potential disadvantages. Courts have developed techniques which enable that balance to be struck in a domestic context -- for instance in cases about nuisance by noise, odour or dust. But at the international level, there is as yet very little jurisprudence in which that balance is struck.

CD: Could you provide an example of where such a court could have served people well?

SH: Two of the most egregious cases are the Niger Delta and Ecuador, where damage has been brought about by industrial and mining activity, and where the domestic or municipal courts system has struggled to give an appropriate answer even ex post-facto[ie after the event], let

alone to provide an answer to on going problems. These are cases in which it seems to us that the world should really be crying out for a [legal] body [to resort to].

Another, hypothetical, example might be a massive oil spill upon a country such as Bangladesh, which doesn't have a particularly well-developed internal system. You can contrast that hypothetical case with the oil spill on the Gulf of Mexico, where it looks as if the matter has been very fully dealt with by the US courts.

CD: Could it play a similar role to the US Environmental Protection Agency (EPA) – but at a global level?

SH: One of the features of an agency like the EPA is that it is able to function as part of a process – if there is some form of industrial or commercial activity that has environmental implications, the agency doesn't have to wait until harm occurs. It can get involved, can investigate, and monitor the process.

We are certainly looking at the possibility that an international environmental court could, in the absence of any currently effective international environmental agency, be asked to have a monitoring role in certain projects. Had there been some form of independent monitoring body to which people could have resorted in the cases of the Niger Delta and Ecuador, then that would certainly have been a very valuable resource.

Equally, you could set up the court and alongside it have a separate international environmental agency.

CD: Could the court have a legitimacy problem?

SH: I think the legitimacy issue is very big, and the way we have sought to address that is by what you might call a staged approach.

What we envisage is setting up, initially, a tribunal of some sort, which would not need to be done through the UN, or even with the consent of any particular national government. It would operate to a large extent virtually, and would receive, hear and adjudicate on disputes brought to it which it felt it could appropriately adjudicate upon.

And if our basic concept is right - if such a body through its method of adjudication and the clarity and cogency of its judgements were increasingly thought to have an important role to play - then gradually it would prove itself. International organisations and major jurisdictions would start to see it as being of real value.

Or alternatively, the very process of seeking to set it up will persuade existing institutions to take over the job, and make the whole task unnecessary. That would be a welcome outcome.

All we want is for there to be suitable institutions to fill the gap.

CD: Is the idea gaining momentum – for instance, since the 2015 Paris Agreement on climate change?

SH: Whereas at the outset the reaction was largely negative, we have seen an increasing acceptance that this is something that is bound to happen eventually. The scepticism is as to how quickly it can happen and the practicality of taking it forward.

There's no direct link with the Paris Agreement, but I think increasing consciousness of environmental problems, and international support for methods of dealing with them, can only be advantageous to the idea. Getting this going requires resources, and a somewhat greater acceptance.

Stephen Hockman is a Queen's Counsel (QC), and has been Chairman of the Bar, (as the professional body for UK litigators is called), and of the Environmental Law Foundation.

卫星与大数据如何帮我们守护海洋?

新的海洋保护区已经划定，新的联合国协议也快要达成，标志着国际海洋保护即将取得巨大突破。为了落实这个雄心勃勃的计划，我们必须强化卫星和在线大数据的应用。

□ 道格拉斯·麦考利

过去一个世纪里，过度捕捞、严重污染以及沿海地区的无序开发给全球海洋环境带来了诸多负面影响。但是现在，两项全新的全球海洋监管措施正逐步崭露头角。这让我们相信，21 世纪初的几十年即将成为新的历史拐点，人类有望在未来开始修复海洋环境。

但是问题的关键在于：这种复杂的卫星技术以及地球健康在线数据的大众化，能否在保护海洋的过程中充分发挥积极作用呢？

第一个令人振奋的政策走向就是世界各国都在积极推动海洋保护区建设，规模之大前所未有。皮特克恩岛海洋保护区是目前拟建的规模最大的大型海洋保护区，总面积是英国面积的 3.5 倍，比传统的中型海洋保护区要大 10 万倍。过去六年间已经建立或宣布要建立的 19 个海洋保护区面积比之前所有保护区的范围都要大。目前拟建的几个大型保护区建成后会在现有基础上使保护海域面积增加 77.5 万平方英里。

第二个关键进展就是联合国正在起草一份公约，该协议将首次对公海海域内的海洋生物多样性管理责任进行限定。（注：公海是指在某个国家 200 英里专属经济区以外的海洋区域。）这份协议涉及的海洋总面积比美国总面积的 22 倍还多，内容主要涉及海洋生物多样性保护、国际海洋保护区建设、海洋基因资源共享评估程序、以及环境影响评估的有效落实等。

如果没有系统的边界监管，大型海洋保护区也只不过是纸上谈兵而已。

这些新的大胆举措说明，决策者们终于决定先于海洋工业化一步，积极采取保护措施——这也是我们在陆地工业化时没能做到的事情。其中涉及的方面不止工业化渔业这一项。最新的技术创新和发展让水下农业、采矿、发电甚至数据中心管理都成为可能。然而，我们也不能高估这些海洋资源利用方式的进步。比如从 2014 年开始，全球鱼类消费中，养殖鱼类所占比重首次超过了野生捕捞——这与人类当初在陆地上逐步用养殖代替捕猎的过程很相似。而采矿业据说已经扩展到近 40 万平方英里的深海区域。

大面积拓展海洋保护区的面积，以及大力提高国际海洋监管的行动无疑是令人振奋的。但是上述两项政策都有一个硬伤：只有确保人们能够严格遵守法律的时候，法律才有意义。这些新政策涉及的海洋领域太大了，相比之下，船只、飞机等传统的海洋观测方式就变得像六分仪一样古旧而“力不从心”。如果没有系统的边界监管，大型海洋保护区也只不过是纸上谈兵而已。所以，除非我们能够正视辽阔的远海海域所发生的一切，否则我们试图通过新的联合国公约控制公海生态多样性开发的努力就不可能成功。

不过，正如技术创新可以推动海洋环境快速发展一样，高科技解决方案同样也可以确保工业进步能够以一种明智和负责任的方式进行。如果政府部门、科研学者、民间科学家以及环保团体能够共同利用好这些技术创新，那我们就可以有效利用并合理规划未来世界海洋环境发展。

其中最重要的一项就是利用卫星互动感应装置和数据处理工具对船只航运进行监控，就像我们现在监控城市中的优步出租车一样。与飞机类似，越来越多的船只都安装

有会实时传送位置数据的感应设备，从而防止船只之间出现刮碰。我们可以利用同样的安全数据流观察工业渔业集中区域，查看海床矿井发掘进展，或者跟踪货运船只航线，避免其与鲸鱼迁徙路线重叠。

我们面临的下一个挑战是如何智能高效地从不断涌入的数十亿数据中筛选出有用信息，以防陷入一个海洋数据黑洞。幸运的是，我们可以通过智能算法从中提取出船只的特定运行数据，因为船只行进都会留下特有的行为指纹记录。比如，围网渔船一般会在撒网的时候环绕着鱼群行驶，而延绳钓渔船则会沿着设下的钓线上下直线行驶。

在《科学》杂志最近刊发的一份报告中，我和我在非盈利组织世界渔业监控的同事们对基里巴斯关闭的一片面积相当于美国加州的渔场进行了密切观察。六个月后，我们很高兴地看到，除了一艘船之外，其他船只都已离开这里前往其他海域进行捕捞。同时，我们还绘制出了太平洋公海海域围网渔船的活动图——这也是公众有机会第一次了解联合国公海保护协议可能覆盖区域的渔业活动状况。

眼下的问题就是，政府能否意识到这种新数据的价值，并响应科学家的号召，要求更多船只安装并充分利用这种观测感应装置。我们估测，目前全球大约有 70% 的大型渔船都已经配备了这种公开追踪系统。然而，有些船长却根本不会使用——他们要么会在离港之后就把追踪器关了，要么不能向系统上传正确的船只身份信息。通过大数据处理，可以轻易地发现以上这些违规行为。

卫星就好像是天上的违章摄像头，一旦海上出现违规者，就会立刻被抓拍下来。

如果政府可以响应号召，弥补这些漏洞，那么上述监控技术将大大增强我们对未知海洋领域的监控和管理能力。

在外太空运行的不仅是船只追踪卫星，一种专门用来拍摄高分辨率地球照片的微型卫星数量也在迅速上升。这项新技术将会成为海洋观测的一项重要的辅助手段。这些小型电子眼集群每天都能够拍摄出整个地球的高分辨率照片。有了这些图像卫星，海洋生物学家、海洋观测群体以及海洋公园管理者就能够实时了解到保护区内的船只情况，对海岸红树林损失进行每周（甚至是每天）的监控，同时还能记录疏浚等工程对珊瑚礁的破坏情况。可以想见，有朝一日这种船只追踪系统的智能衍生产品最终可能会与这些拍照卫星联动，就像太空违章摄像头一样，将海上违规事件抓拍下来。

当然，也不是所有海洋观察技术都需要依赖外太空。新出现的一系列海洋监测技术也能够派上用场。比如，人们已经开始利用无人机进行海岸水域巡逻。遥控船舰队也可以进行类似的活动，并且还能够同时协助观测海洋资源健康状况，以及资源开采者的行为举动。此外，能够监听船只声音的海岸或机载雷达以及声波记录仪也不失为一种监控手段。

对海洋工业化进程进行有效监测和控制的关键在于这种新海洋观测数据的大众化。因为，以往这种海上数据只有船长能够看得到、看得懂。

好消息就是，陆地上出现的物种灭绝问题在海洋中目前还没有出现。但是就像生态学家道格拉斯·麦考利在耶鲁环境 360 峰会上接受采访时所说的那样，海洋生命现在面临的威胁 也许比过度捕捞还要危险的多。

现在，任何一个人都可以通过手机监控遥远海洋中的情况。比如，全球渔业监控组织就在今年发布了一款新产品，任何人都可以通过它免费观察全球渔业数据，或者参与数据互动。而成立不久的全球最大规模的地球影像卫星星座群——星球实验室最近推出了一个免费图库，其中包含了加州各个地方的图片（比如河口、海湾、海草林以及近岸水域等等），后台数据库目前也在不断更新扩充。

如今，我们已经进入了一个海洋管理的新阶段，打算监管的海洋水域面积也在不断扩大。要想完成这一挑战，就必须确保所有的政策都能落到实处。这个任务很艰巨，也很紧迫。如果我们希望未来海洋能够继续提供大量的食物、能源和娱乐资源，我们就必须保证新的保护区和保护协议能够运作起来，而且必须马上行动。

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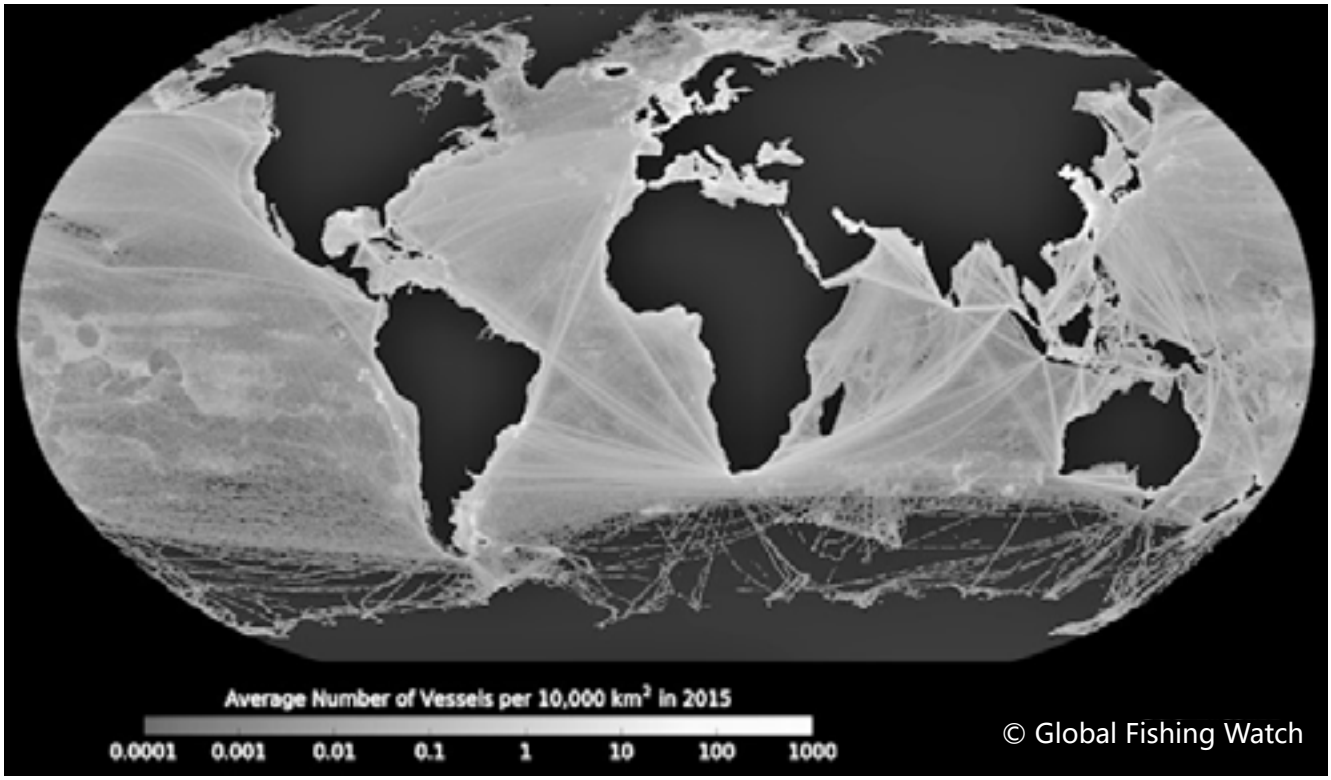
道格拉斯·麦考利，美国加州大学圣巴巴拉分校和阿尔弗雷德P分校海洋生物学教授

Big data can help save the oceans

New technology can enable better policing of the world's oceans.

□ Douglas McCauley



An illustration of ship traffic in 2015

Over the past century, rampant overfishing, severe pollution, and runaway coastal development have taken a huge toll on the world's oceans. Now, however, two major advances in global ocean governance are quietly unfolding, offering hope that the early decades of the 21st century will mark a turning point in which humanity can begin to repair the global seas.

Yet a key question remains: Will the new availability of sophisticated, satellite-based technologies, coupled with the democratisation of online data about the health of our environment, help ensure that these positive advancements live up to their potential to protect the oceans?

The first encouraging policy development is the explosive movement by countries around the world to set up massive

marine protected areas of unprecedented size. The biggest of these newly proposed mega-marine protected areas, the Pitcairn Islands Marine Reserve, is three-and-a-half times larger than the UK, and more than 100,000 times larger than the historical median size for an ocean protected area.

• The 19 mega-marine protected areas created or announced in the last six years would comprise an area larger than all the protected ocean areas created previously. Several huge marine reserves currently being considered would add an additional 775,000 square miles (1.8 million square kilometres) of ocean protection.

The second key development is that the UN is now drawing up a treaty that would, for the first time, manage biodiversity across the high seas — the region outside the 200-mile exclusive economic zones of individual nations.

• The forthcoming UN high seas treaty would be setting new rules for a swath of the ocean 22 times larger than the US. These new regulations are focused on preserving marine biodiversity, establishing international ocean reserves, evaluating processes for sharing marine genetic resources, and effectively carrying out environmental impact assessments.

In the absence of systems to monitor boundaries, large marine protected areas will be nothing more than huge paper parks.

These bold new policies suggest that decision-makers are finally committed to taking the kind of aggressive actions needed to stay a step ahead of industrialisation in the oceans — something we failed to do when industrialisation occurred on land.

• This issue extends well beyond industrial-scale fishing. Recent innovation and technological development have now made it possible to take the industries of farming, mining, power generation, and even data centre management underwater.

• The scope and significance of this mass acceleration of new uses of the ocean cannot be overstated. In 2014, for example, the world began eating more fish from farms than from the wild — a marine reprise of our historic shift on land from hunting wild food to farming. Mining claims have already been staked to roughly 400,000 square miles of deep-sea ecosystems.

The campaigns to vastly expand marine protected areas and significantly improve international governance of the oceans are extremely exciting. But both of these important policy movements have an Achilles heel: Laws only matter if you can ensure that people actually follow them.

• These new policies cover such vast areas that they render boat, plane, and other traditional forms of ocean observation as obsolete as sextants. In the absence of systems to watch their boundaries, large marine protected areas will be nothing more than huge paper parks. Likewise, our efforts to control the exploitation of high-seas biodiversity via the new UN treaty will only be effective if we aren't blind to what is happening in this large and distant part of the ocean.

But just as technological innovation is fueling a rapid acceleration of development in the ocean, high-tech solutions may also hold the key to ensuring that a marine industrial revolution advances responsibly and intelligently. These advances, when put in the hands not just of governments but also of researchers, citizen-scientists and environmental groups, promise a new era in which we can actively observe and responsibly plan out what's going on in the world's seas.

A vital solution lies in the use of satellite-interfacing sensors and data processing tools that are beginning to allow us to watch how ships use the oceans as easily as we track Uber taxis cruising around a city. Like airplanes, more and more ships now carry sensors that publicly transmit their position so they don't crash into each other. We can make use of these same streams of safety data to detect where industrial fishing is concentrated, to watch as seabed mining exploration begins, and to observe how cargo ships overlap with whale migration pathways.

Instead of the oceans being a black hole of data, our new challenge is figuring out ways to intelligently and efficiently sift through the billions of data points now pouring in. Fortunately, smart new algorithms can help pick out specific kinds of vessel behaviour from this sea of big data.

"The UN treaty will only be effective if we aren't blind to what is happening in this large and distant part of the ocean."

Ships leave unique behaviour fingerprints. For example, purse seine fishing boats make circles around fish schools when setting their nets, while long-line fishing boats travel linearly up and back along the gear they set.

In a recent report in the journal Science, colleagues at the non-profit Global Fishing Watch and I monitored progress as the nation of Kiribati closed a section of its ocean the size of California to fishing. After six months of observation, we happily saw that all vessels, save one, left to fish elsewhere. Our group also mapped out the activity of purse seine (a type of net) fishing boats on the high seas of the Pacific — generating the first publicly accessible view of where fishing activity occurs in the very region that the UN high seas convention may consider setting up international protected areas.

A key question ahead is whether governments will realise the value of this new data and act on calls from the scientific community to require that more vessels carry these observation sensors and use them properly.

We estimate that approximately 70% of all large fishing vessels worldwide are already equipped with these publicly accessible tracking systems. Some captains, unfortunately, misuse the tool by turning it off after leaving port or failing to enter proper vessel identification information into the system. All such noncompliance issues are readily detectable by big data processing.

Imaging satellites can function like space-based red light cameras that snap pictures of law-breakers at sea.

If political will can be mustered to close these loopholes, these observation technologies could shed an immense amount of light on our now-dark oceans.

Orbiting in space alongside these ship-tracking satellites is another rapidly growing fleet of nanosatellites that constantly take high-resolution pictures of the earth. This technology promises to be an important additional piece in the ocean-observation puzzle.

Tracking

The goal of the groups tending to these flocks of tiny electronic eyes is to be able to take a high-resolution snapshot of the entire earth, every day. These new imaging satellites may soon allow marine ecologists, ocean conservation groups, and marine park managers to begin to search in near real-time for ships in protected areas, to monitor weekly (even daily) losses of coastal mangrove forests, and to document abuses to coral reefs, such as dredging.

With foresight, the intelligence derived from the vessel tracking systems may eventually be interlinked with these imaging satellites to enable them to function like space-based red light cameras that snap pictures of law breaking at sea as it happens.

Not all next-generation ocean observation has to be based in outer space. An exciting array of new marine-monitoring technologies is increasingly available that also could be useful. Aerial drones are beginning to be used to patrol coastal waters. Fleets of drone ships may follow suit and could help monitor both the health of ocean resources, as well as the behaviour of those that harvest them. Shore- and aircraft-based radar and acoustic recorders that listen for boat noise could also be deployed.

High stakes

Now, anyone can keep tabs on the most remote parts of the ocean on their phones. Global Fishing Watch, for example, is releasing a product this year that will let anyone view and interact with data on fishing from across the global oceans for free. Planet Labs, a startup that manages the largest constellation of earth-observing nanosatellites, recently released a constantly updated, free library of imagery for all of California – including its estuaries, bays, kelp forests, and nearshore waters.

The challenge ahead, as we enter this new era of improved ocean stewardship and attempt to govern increasingly bigger regions of the ocean, is to ensure that our new policies are actually enforced. The stakes here are high. We have to make these emerging protected areas and treaties work, and we must do it soon, if we intend to help the oceans continue to dish out large helpings of food, energy, and wonder.

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Douglas McCauley is a professor of marine biology at the University of California, Santa Barbara and an Alfred P. Sloan Research Fellow in the Ocean Sciences.

淘汰氢氟碳化物：制造业承压

中国已经承诺逐步淘汰令地球升温的制冷剂氢氟碳化物，这将对占据全球氢氟碳化物生产半壁江山的中国带来巨大挑战，或许还有机遇。

□ 冯 灏

全球最大的氢氟碳化物（HFCs）生产国中国上个月刚刚承诺，最晚在 8 年内使这一温室气体的排放达峰，并于 2045 年将排放量降低至历史最高水平的 20% 以下。

作为化工业大国，中国的承诺在近 200 个成员国共同签署的《蒙特利尔议定书》修正案中显得格外关键。签订于卢旺达首都基加利的协议将确保到 2050 年全球基本淘汰氢氟碳化物的使用，仅此一项举措到本世纪末就能减少 0.5 摄氏度的全球升温，签订基加利协议因此被认为是全球对抗气候变化行动所取得的重大进展。

北京大学环境科学与工程学院教授胡建信作为氢氟碳化物修正案谈判成员多次参加了相关谈判。他对于中国淘汰氢氟碳化物的前景表示充满信心："虽然面临着困难和挑战，但我相信中国可以做得更好。"

从臭氧层救星到超级温室气体

作为一种人工合成的制冷剂，对臭氧层较为安全的氢氟碳化物是作为臭氧层消耗物质氯氟烃（CFCs）和氢氯氟烃（HCFCs）的替代品出现的。

但很快科学家就发现，氯氟烃和氢氯氟烃的主要替代品氢氟碳化物温室效应潜值（GWP）极高，会产生巨大的气候影响。胡建信指出，氢氟碳化物包含一系列化合物，同等重量氢氟碳化物的温室效应是二氧化碳（CO_2）的几千甚至上万倍。根据在基加利达成的氢氟碳化物减排目标核算，中国将在 2050 年避免温室气体排放 430 亿吨二氧化碳当量，这相当于当前中国年排放水平的四到五倍。

> "签订于卢旺达首都基加利的协议将确保到2050年全球基本淘汰氢氟碳化物的使用，仅此一项举措到本世纪末就能减少0.5摄氏度的全球升温，签订基加利协议因此被认为是全球对抗气候变化行动所取得的重大进展。"

艰难的淘汰

对于拥有庞大化学品制造业和电器制造业的中国，要迅速淘汰氢氟碳化物并非易事。

一方面氢氟碳化物的消费用途广泛。含氟温室气体替代及控制处理国家重点实验室主任张建君介绍道，包括制冷剂、发泡剂、清洗剂等都有可能使用它。仅制冷领域就包括家用空调、汽车空调、工商制冷、保鲜冷藏、工业制冷等。另一方面，作为制冷剂的氢氟碳化物通常与工业产品的核心部件和技术息息相关。以制冷产品为例，制冷剂作为设备的"血液"存在，相关零部件都围绕其安排。这意味着，使用其他化学品替代氢氟碳化物作为制冷剂的时候，制冷系统的部件甚至材料都需要进行相应调整。

庞大的规模也令中国化工业和制造业的技术换代成本格外高。据多位业内人士透露，中国氟硅有机材料工业协会内部发行的《氟化工十三五规划》指出中国氢氟碳化物的产量占全球六成以上。浙江省化工研究院有限公司高级工程师郑冬

芳认为，在制冷技术的更新换代面前，中国的大多数相关制造业都是有压力的。一位不愿透露姓名的业内人士坦言，产业界肯定是希望不淘汰最好，可以持续生产、持续盈利，但是中国作为负责任的大国，经济发展有的时候要服从于政治。

而更麻烦的是，氢氟碳化物本身是作为臭氧层消耗物质替代品被引入大批量工业生产的，上一次换代尚且没有完成。2015 年，中国有一半以上的空调产品还在使用含氯产品作为制冷剂，而中国目前依然是全球最大的消耗臭氧层物质生产国和使用国。依据《蒙特利尔议定书》，中国从去年才开始需要削减氢氟碳化物的上一代产品氢氯氟烃（HCFCs）产量，淘汰过程可持续到 2040 年。换句话说，中国需要在 20 多年的时间里同时淘汰两代制冷剂。

全球替换冲击中国制造

为了照顾发达国家与发展中国家的发展阶段差距，基加利协议给各国制订了三套氢氟碳化物淘汰时间表，其中发达国家于 2019 年之前就要开始削减氢氟碳化物用量，而包括中国在内的第一梯队发展中国家则要从 2029 年开始淘汰。尽管如此，由于中国制造业为大量发达国家的跨国公司代工，使得中国化工厂必须为 2019 年提前做好准备。

欧美在涉及臭氧层消耗物质产品的市场准入趋于严格。以美国为例，根据其环境署对于臭氧层消耗物质替代品 / 替代技术进行评估、鉴定和公开发布的计划《重大新替代品政策计划》（SNAP）及不断更新的名录，氢氟碳化物的种类、用途、产品的类型都有详细的禁止性规定。

中国工厂制造的终端产品大规模用于出口发达国家。张建君表示，出口市场对中国的家电企业提出了更高的要求，需要使用气候友好型、更环保的替代品，这就对替代品生产企业提出新的要求。

张建君还补充，一直以来，在环保制冷剂领域中国都落后于世界领先水平。从最早的氯氟烃到最新的替代品氢氟烯烃（HFO），他表示：“几代下来，基本就是被跨国公司牵着鼻子走。”跨国公司创新投入大，具有长期的科技积累和发达的替代品开发与评价体系。中国由于缺乏这些因素，始终处于跟随和模仿阶段，而且不注重知识产权和标准的制定，要么面临专利纠纷，要么与跨国公司合作沦为其加工厂，缺乏在世界臭氧层消耗物质替代品发展进程中的话语权。他表示，中国除了在履行国际公约上做出表率，更需要在开发具有中国自主知识产权的新一代替代品上面占有一席之地。

尚待改进的替代品

不过胡建信认为，替代品的生产和使用过程本身也会形成新的产业链条。针对业界的顾虑，他带领团队做了很多社会经济影响分析，发现逐步减排氢氟碳化物对社会经济的影响有利也有弊。

以电动车制冷剂为例，能效是电动车重要的考量指标，采用什么样的制冷和制热系统将与传统汽车不同。传统汽车以引擎燃烧产生的余热为空调系统提供热源，但电动汽车并没有热源，需要额外发电制热，所以产品体系整体在变化，制冷剂也需要相应换代。当前中国政府正在力推传统汽车向新能源汽车的转型，这为氢氟烯烃的发展创造了很好的机会。但氢氟烯烃的问题是成本相对较高，并且暂未在中国产业化。

环保部和中国家用电器协会正在推广以丙烷（R290）为主的纯自然化合物作为替代制冷剂。这类产品单纯从制造成本来讲未必高，因为其是天然物质，不需要化工合成，但其障碍在于具有可燃性，存在安全隐患。这就对产品的灌装量、售后安装、运输标准及使用操作提出了更高的要求，增加了安全保障的成本。

据一个美国行业协会估算，要生产一种新的制冷剂，化工厂可能需要花 2 亿美元对生产线进行整体改装。更环境友好的产品和技术已经存在，但牵一发而动全身，淘汰和替代都需要生产体系的全面变革去配合，而这必将带来成本负担。但换个角度来看，部分还在生产老式制冷剂的中国工厂也有机会跳过氢氟碳化物，直接更换到最新的气候友好制冷剂，这也许对地球和工厂本身都是一件好事。

冯灏，中外对话研究员

Pressure mounts to phase out HFCs

China produces half of the world's HFCs, phasing them out will be a big challenge for manufacturers

□ Feng Hao

In October, almost 200 nations agreed to an amendment of the Montreal Protocol that will see the emissions of hydrofluorocarbons (HFCs), a type of greenhouse gas used in fridges, air conditioning units and aerosols, phased out. This one action is expected to reduce global temperature rise by the end of the century by 0.5°C, a third of the 1.5°C cap agreed under the Paris Agreement.

As a major player in the chemicals industry, and the world's biggest producer of HFCs, China's agreement was crucial to the deal and to global action on climate change. But reducing HFCs by 2045 to 20% of the historical peak will be a challenge.

Hu Jianxin, a professor at Peking University's College of Environmental Sciences and Engineering, helped negotiate the new amendment. He is sure China can fulfil its commitment: "There will be difficulties and challenges, but I'm confident China can do it."

The fall of HFCs

HFCs are manmade refrigerants that were introduced in the late 1980s when the Montreal Protocol was first signed. They are not damaging to the ozone layer unlike the chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) they replaced. But they are powerful greenhouse gases.

> "China now has 20 years to phase out two generations of refrigerants."

In fact, some HFCs are thousands of times more effective than carbon dioxide at trapping solar radiation. According to targets in the new amendment, by phasing out HFCs by 2050, China will avert the release of 43 billion tonnes of carbon dioxide (CO_2) equivalent, four or five times China's current annual CO_2 emissions.

A challenge to implement

China produces over 60% of the world's HFCs, according to the China Association of Fluorine and Silicon Industries. Phasing out HFCs will be particularly challenging for the country because it manufactures the chemicals, and the appliances that use them, in such huge quantities as well as the appliances that use them.

HFCs are essential to the function of a wide range of applications such as refrigerants, foaming agents and cleaning products. As a refrigerant, HFCs are found in domestic and vehicle air conditioners, and refrigeration systems, where they act almost as the "blood". Replacing HFCs means re-designing products and components, and possibly using new materials; an enormous undertaking by industry strandards.

The enormous scale of China's chemicals and manufacturing sectors means that phasing out HFC will be expensive.

Zheng Dongfang, senior engineer at the Zhejiang Chemical Industry Research Institute, concedes that changes to refrigeration technology will put firms under pressure. One insider, who preferred to remain anonymous, admitted that the industry would prefer

Tight deadlines: Under the Montreal Protocol, China must peak HFC emissions by 2024 and deliver 10% reductions soon afte

to continue profiting from HFCs but acknowledges that as a responsible country China must sometimes put politics and the environment before economic development.

More troublesome is that HFCs were originally introduced as an alternative to other chemicals that damage the ozone layer – and that replacement process in China is not yet complete. China remains the world's biggest producer and user of ozone depleting substances. In 2015, more than half of China's air conditioners relied on refrigerants containing chlorine.

Under the Montreal Protocol, it was only last year that China started reducing production of HCFCs in favour of HFCs, a process that could take until 2040. In other words, China now has 20 years to phase out two generations of refrigerants.

Global changes hit Chinese manufacturing

Securing an amendment to the Montreal Protocol required countries to acknowledge differences between developing and developed nations. Three timetables for phasing out HFCs were agreed on: one for developed nations, which must deliver a 10% reduction on 2011-2013 levels by 2019; and two for developing ones, which must peak emissions by 2024 and 2028, respectively, and deliver 10% reductions in the following years.

China is in the first group of developing nations but as the country manufactures large quantities of products for developed nations, its chemical factories must begin preparing to phase out HFCs from 2019 onwards.

Access to the EU and US markets for products containing ozone depleting substances is stringent. For example, under its Significant New Alternatives Policy (SNAP) programme, the US Environmental Protection Agency assesses and updates a public list of alternatives to ozone depleting substances and technologies. There are detailed rules banning certain types and uses of HFCs, and products.

Zhang Jianjun, director of the Key State Laboratory for Substitution and Controlled Disposal of Fluoride-containing Greenhouse Gases, explained that export markets will require China's appliance manufacturers to use alternative, climate-friendly and environmentally-sound components.

In many respects, China is already lagging behind in the use of advanced environmentally-friendly refrigeration technology. From the earliest CFCs to the latest alternatives, known as hydrofluoroolefins (HFOs),

"For several generations of technologies, we've taken our lead from the multinationals," said Zhang. Multinational organisations tend to invest heavily in innovation and have rich technical experience and sound systems for development and evaluation of alternatives to ozone depleting substances. Instead, Chinese state-owned enterprises have typically followed or copied, paying little attention to intellectual property or contributing to standards – meaning firms get mired in copyright disputes, or end up doing outsourced work for the multinationals, leaving them with no voice in the process of developing alternatives.

Zhang said that as well as taking the lead in implementing international agreements, China must carve out its own niche in developing its own distinct proprietary alternatives.

Improving the alternatives

This approach makes sense, according to Hu Jianxin. He thinks that the production and use of alternatives will in itself create a new industry. In response to industry concerns, his team has carried out a great deal of analysis of the socioeconomic impact of reducing HFC emissions and found that there will be benefits, not just costs.

Take vehicle heating systems, for example. Conventional vehicles use waste heat from the engine to heat air for the air conditioning system. However, EVs do not produce surplus heat so must draw on the battery pack for heating, which limits a vehicles' range performance. The Chinese government is promoting the rapid adoption of EVs in preference over conventional vehicles. This provides an ideal opportunity for companies to create different systems and new HFOs for refrigeration. However, for now HFOs remain costlier to use than HFCs and China has not yet commercialised the technology.

The Ministry of Environmental Protection and the China Home Electric Appliance Association is currently promoting refrigerant grade propane (R290) as an alternative. The use of propane is appealing because it is a natural substance that does not need to be synthesised. However, there are safety concerns associated with its use because it is flammable. This makes storage, transportation, installation and use more difficult, and means more expensive safety measures.

Greener products and technologies already exist, but transitioning manufacturing processes and product designs in order to harness them is costly. According to one US industry association, reconfiguring a production line to create a new refrigerant could cost US$200 million (1.4 billion yuan).

For Chinese manufacturers though, there is a silver lining. Those still producing older refrigerants can skip the use of HFCs altogether and shift directly to the latest environmentally-friendly alternatives; good news for both factories and the planet.

Feng Hao is a researcher at chinadialogue.

生物多样性缔约方大会达成多项协议

各国与会代表就修复生态系统、改善对话机制以及追踪生态目标达成一致。

□ 迈克·沙纳罕

日前，联合国《生物多样性公约》第十三次缔约方会议在墨西哥坎昆召开，与会各国政府代表经协商达成了一系列旨在保护自然的决议，力求确保自然资源的可持续利用，以及公平公正地分享自然资源所带来的惠益。

联合国《生物多样性公约》缔约国几乎涵盖全球除美国以外的所有国家。这些国家都同意将生物多样性纳入本国关键经济部门的政策之中。参加此次高层会谈的除了环境部长之外，还首次汇集了农、林、渔、及旅游部门的部长。

根据《坎昆宣言》（PDF），与会各国部长及代表团团长承诺采取具体行动，“确保国内各级政府通力合作，联合各个部门，推动生物多样性保护成为主流趋势，建立有效的制度框架、立法机制和管理体制。”

“主流化”配合在国民经济核算体系中加入生物多样性的指标，这最终或许能够让生物多样性获得应有的关注。

尽管协商获得进展，但发达国家和发展中国家之间出现的新裂痕或将对长远合作留下不小的阴影。双方围绕基因序列数字信息共享问题出现的分歧可能会对《公约》造成深远影响。该问题将留给2018年召开的下一届缔约方会议来解决。

喜忧参半

12月4日至17日召开的坎昆大会有167个国家的4000名代表参加。大会在各种高调的宣言中拉开了帷幕。巴西公布于2030年之前修复2200万顷退化土地的计划，修复土地规模创历史新高；墨西哥宣布将新建4个生物保护区，并提高5块区域的保护等级。其他还包括，日本承诺提供1600万美元用于支持发展中国家的能力建设。

但也有坏消息。国际自然保护联盟宣布，新近确认的700个鸟类品种中约有11%濒临灭绝，而长颈鹿数量在三十年里下降了40%。与此同时，《公约》秘书处警告称，有三分之二的《爱知生物多样性目标》将无法在2020年截止之前达成，“这将给人类带来严重后果”。《爱知生物多样性目标》设立了减缓生物多样性损失的20个全球性目标。

盛产决议的大会

在坎昆大会上，各国政府商定了超过70个详细决议，从丛林野生动物肉类的可持续利用到气候相关的地质工程，从外来物种入侵到海洋废弃物和水下噪声的影响，内容包罗万象。

大会通过了一项关于生态恢复的短期行动计划，并决定采取行动改善对粮食安全至关重要的传粉生物的保育和管理工作，还提出了一套用

“在坎昆大会上，各国政府商定了超过70个详细决议，从丛林野生动物肉类的可持续利用到气候相关的地质工程，从外来物种入侵到海洋废弃物和水下噪声的影响，内容包罗万象。”

于追踪爱知目标落实情况的指标。

其他决议涉及传统知识的复兴，具有重要生态或生物意义的海洋区域建设，以及能力建设，此外还通过了一个全球沟通策略等。各缔约国商定了相关指导意见，以确保《公约》的多边金融机制全球环境基金能够优先考虑坎昆大会通过的事项。

原住民团体的抗争

这些进展来之不易。会议倒数第二天，正当各方在讨论能否确保原住民及当地社区在决定分享他们的传统知识时享有话语权、并在分享使用他们的传统知识时能够获得收益的提案时，原住民及当地社区代表却退出了谈判。

他们对提案中所描述的原住民团体以何种方式授权使用这些知识的表述表示不满。非政府组织也以静坐方式支持原住民团体。

一番辩论后，各缔约国最终通过了指导方针，指出应在“充分尊重”原住民及当地社区的前提下执行“事先知情同意”、或“自主、事先和知情的同意”或“认可和参与”（具体情况视各国国情而定）等原则。

警惕新技术的风险

“合成生物学”也是更具争议性的话题之一。这一技术可以制造有生命和无生命的有机体、遗传材料以及生物系统。这是一种新兴生物技术，既能给生物多样性保护和可持续利用带来机遇，也蕴藏着巨大风险。

基因驱动技术就是合成生物学应用的一个例子。通过这一技术，人类可以将某一基因性状扩散到动植物种群中去。该方法可用于减少作物虫害或控制传播疾病的蚊子的繁殖，也可用于消除杂草的抗药性。

此类技术可能给生物多样性带来的危害引起了人们的担忧，大会最终决定建议各国政府采取预防性办法，并表示目前的风险评估方法需要升级，以适应未来合成生物学的应用。

大会通过的决议鼓励各缔约国开展有关合成生物学潜在利弊的研究和对话，并扩大了《公约》专家组的职责，要求他们对该新兴领域的相关信息进行审议和分析。

管控风险，分享收益

大会还围绕《公约》下的专项协议《卡塔赫纳议定书 》开展了协商会谈。该议定书旨在确保安全处理、转移及使用凭借现代生物技术获得的、可能对生物多样性产生不利影响的改性活生物体。

《卡塔赫纳议定书》缔约方商议通过了改性活生物体风险管理、过境以及封闭使用的相关决议，并就此类生物体的意外越境转移问题达成一致。

与此同时，大会还就《名古屋议定书》展开了讨论，该议定书的内容主要关于获取遗传资源以及公平合理地分享利用遗传资源所产生的惠益。《名古屋议定书》主要是协调原住民社区或是国家政府等遗传资源的提供者，和大学、生物技术公司等资源使用者之间的关系。

《名古屋议定书》自 2014 年起生效，要求遗传资源的供需方协商达成一致，确保使用过程中遵循供应方“事先知情同意”的原则。但鉴于某些情况下无法做到事先知情同意，缔约各国决定采取行动建立一个全球多边惠益分享机制。

生物信息“盗版”惹争议

大会协商过程中最具争议的是“遗传资源数字序列信息”公布的问题。一些项目不顾《公约》中遗传资源使用者需和资源提供国或社区分享惠益的要求，将具有商业价值的基因序列公布在网络上，这一做法让巴西、南非以及印度等生物多样性国家颇感担忧。

此类数据一旦放到网上，任何人都能轻而易举地获取并加以利用，无需获得实际的遗传资源。发展中国家担心这会导致“数字生物盗版”，使得一国的植物、微生物、动物及真菌的信息被用作商业用途，却无法分享惠益。

然而，一些国家认为，《生物多样性公约》及下属专项协议《名古屋议定书》仅适用于物质资料而非信息。最终，缔约国一致认为《公约》应征求意见，开展调查，成立专家组对遗传序列信息使用对《公约》及《议定书》造成的影响进行评估。

专家组大概会在 2017 年向《公约》下属机构提交科学、工艺和技术方面的建议，以便各缔约国能够在 2018 年的埃及缔约方大会上做出合理决策。

鉴于遗传资源获取及惠益分享是《生物多样性公约》的三大支柱之一，未来几年这一领域的交锋会很有看头。埃及大会之后，《生物多样性公约》缔约方大会将于 2020 年和 2022 年分别在中国和土耳其召开。

迈克·沙纳罕，记者，自由撰稿人

Biodiversity talks end in pledges

International negotiators have agreed to measures to restore eco-systems, improve conservation and track biodiversity targets

□ Mike Shanahan

Two-thirds of the Aichi Biodiversity Targets – 20 globally agreed goals to address biodiversity loss – are at risk of not being met by the 2020 deadline

Intergovernmental negotiations under the UN Convention on Biological Diversity (CBD) in Cancún, Mexico ended on Friday with a slew of decisions aimed at safeguarding nature, ensuring natural resources can be used sustainably, and that the benefits are shared fairly and equitably.

The parties to the CBD, which include nearly all countries except the United States, agreed to integrate biodiversity into the policies of key economic sectors that depend on and impact nature. For the first time, high-level participation included environment ministers and also ministers of agriculture, forestry, fisheries and tourism.

The gathered ministers and heads of delegations committed in a Cancún Declaration to specific actions in each of these sectors, and "to work at all levels within our governments and across all sectors to mainstream biodiversity, establishing effective institutional, legislative and regulatory frameworks".

This "mainstreaming" approach, coupled with pledges to bring the values of biodiversity into national accounting systems, may mean that biodiversity at last gets the attention it deserves.

However, despite the progress, a new rift between

developed and developing countries has emerged. The split, which concerns digital information on genetic sequences, may have far-reaching implications for the CBD and will be addressed at its next meeting in 2018.

Good news and bad

The Cancún talks, held from 4-17 December and attended by four thousand delegates from 167 countries, got off to a good start with a number of high profile announcements. Brazil unveiled plans to restore 22 million hectares of degraded land by 2030, the largest ever commitment of this kind. Mexico announced four new biological reserves and five more protected areas. Among other moves, Japan pledged US$16 million to support capacity-building activities in developing countries.

It wasn't all good news though. The International Union for the Conservation of Nature declared that 11% of 700 newly-recognised bird species are threatened with extinction and that giraffes have declined in number by 40% in just three decades. Meanwhile, the CBD Secretariat warned that two-thirds of the 20 globally agreed goals to address biodiversity loss – the Aichi Biodiversity Targets – are at risk of not being met by the 2020 deadline, "with serious consequences for human well-being".

Decisions, decisions

In Cancún, governments agreed more than 70 detailed decisions on everything from sustainable use of bushmeat to climate-related geoengineering, from invasive alien species to the impacts of marine debris and underwater noise.

They adopted a short-term action plan on ecological restoration, a decision to improve conservation and management of pollinators that are essential for food security, and a set of indicators for tracking progress towards the Aichi targets.

Other decisions included the repatriation of traditional knowledge; ecologically or biologically significant ocean areas; capacity building; and a global communication strategy. Parties also agreed on guidance to ensure the Global Environmental Facility, the CBD's multilateral financial mechanism, can prioritise issues agreed in Cancún.

Protests and progress

Progress was not easy. On the penultimate day, representatives of indigenous peoples and local communities walked out of negotiations on guidelines for ensuring they have a say in how their traditional knowledge can be accessed and that they share the benefits arising from its use.

They were unhappy with proposed language describing how these groups would give consent to the use of their knowledge. Nongovernmental organisations staged a sit-in protest in solidarity.

After much debate, the parties to the CBD adopted the guidelines with text that says "prior informed consent", or "free prior informed consent" or "approval and involvement", depending on national circumstances, should be implemented in a context of "full respect" for the indigenous peoples and local communities.

Emerging science

Among the more controversial topics under discussion was 'synthetic biology', an emerging field of biotechnology that offers both opportunities and risks for the conservation and sustainable use of biodiversity. Synthetic biology can be used to create both living and non-living organisms, genetic materials and biological systems.

One example is the use of so-called gene drives, through which it is possible to force a genetic trait to spread through a population of plants or animals. This approach could be used to reduce reproduction in crop pests or mosquitoes that spread disease, or to eliminate pesticide resistance in weeds.

Amid concerns that such approaches could harm biodiversity, the final decision on this topic invites governments to take a precautionary approach and says current ways to assess risks may need to be updated for future applications of synthetic biology.

The decision adopted encourages parties to the CBD to do research and foster public dialogue on potential risks and benefits of synthetic biology. It also extended the mandate of the CBD's expert group to review and analyse relevant information on this emerging field of science.

Managing risks, sharing benefits

The negotiations included talks under the CBD's Cartagena Protocol that aims to ensure the safe handling, transport and use of living modified organisms resulting from modern biotechnology that may have adverse effects on biological diversity.

Parties to the Cartagena Protocol agreed to decisions on risk management, transit and contained use of living modified organisms, and on unintended transboundary movements of such organisms.

Parallel talks focused on the CBD's Nagoya Protocol on access to genetic resources and the sharing of benefits arising from their use. The Nagoya Protocol governs interactions between providers of genetic resources, whether communities of indigenous peoples or national governments, and users of such resources such as universities or biotech companies.

In force since 2014, the protocol requires the two sides to reach mutually agreed terms and ensure that resources are used with the prior informed consent of the providers. But as there are cases in which this has not been possible, the parties to the protocol agreed actions that could lead to the establishment of a global multilateral benefit-sharing mechanism.

Digital dispute

Among the most contentious issues in the negotiations was 'digital sequence information on genetic resources'. Biodiverse countries such as Brazil, South Africa and India are concerned by projects that place commercially valuable DNA sequences online without following CBD rules requiring users of genetic resources to share benefits with source countries or communities.

Once such data is online, anyone can easily access and use it without needing physical access to genetic resources. The fear among developing nations is that this will lead to 'digital biopiracy', whereby information that originated in a country's plants, microbes, animals or fungi could be commercially exploited without any benefits flowing back to that country.

Some nations argued however that the CBD and its Nagoya Protocol apply only to physical material and not information. In the end, the parties agreed that the CBD should seek views, commission research and set up an expert group to assess what implications the use of genetic sequence information has for the CBD and Nagoya Protocol.

The expert group will report to the CBD's subsidiary body on scientific, technical and technological advice, probably in 2017, so that the parties to the CBD and Nagoya Protocol can make an informed decision when they next meet, in 2018 in Egypt.

As the question of access and benefit-sharing is one of the three pillars of the CBD, this will be a fight to watch in the years ahead. After Egypt, the CBD's parties will meet in China in 2020 and Turkey in 2022.

Mike Shanahan is a freelance writer and journalist

在人口70亿的世界里，我们如何保护野生动植物？

关于如何保护濒危物种，世界正站在一个十字路口，9月份两次至关重要的全球性会议就这一紧迫问题展开讨论。

□ 约翰·斯坎伦

一套用拉美小羊驼的超细驼毛制成的西装价值数千美元，好在对这一稀有产品的争相购买已经得到抑制，小羊驼的种群数量从六十年代末的 6000 头增加到如今的 40 万头。

消费者和收藏家们都想得到各种稀罕物：鲟鱼子、蛇皮手袋、鲨鱼肉和鱼翅、野生的雪莲球茎、珍贵的红木家具、质量上乘的沉香油，以及珍稀的鸟类、爬行动物、仙人掌和兰花这些动植物活体。但他们极少会停下来想想这些东西的来源。要知道，如今世界上有 70 多亿人每天都在通过药物、食品、衣服、家具、香料和奢侈品等各种方式消耗着生物多样性。人们对于取自自然的产品的需求不断增加，野生物种面临的压力也在不断增大。

人类从自然获取资源的能力是无限的，现代交通的范围更是无疆的。世界每年的国际旅客人数多达 11 亿人次，每天有 10 万个航班，每年的集装箱数量多达 5 亿个，合法的和非法的野生动植物产品可以被运到世界任何角落。扩大全球贸易、促进发展与保护野生动植物之间的矛盾愈演愈烈，有时他们的目标看起来甚至是南辕北辙。

不过，我们也有剧增的消费得到抑制的例子。比如在野生动植物保护的《华盛顿公约》之下，通过规范贸易使一系列动植物制品的需求受到控制，包括用来制作高级西装的小羊驼毛、被当作珍馐的皇后螺、做成表带的短吻鳄皮以及用作前列腺药的非洲樱桃树皮。这些措施既惠及了物种本身，也能给当地社区及其发展造福。

以野生动植物为主的旅游业从严格的贸易控制措施中受益良多，因为控制措施保护了此类利润不菲且不断壮大的旅游业的卖点——野生动植物。山地大猩猩就是一个典范，加强执法和管理良好的旅游也让大猩猩数量不断攀升。

在适当的条件下，贸易可以成为野生动植物可持续管理的一大激励。它可以为当地社区带来积极的经济收益。还用小羊驼来举例子，当种群数量从六十年代末的 6000 头增加到如今的 40 万头，单靠驼毛贸易就解决了近 1000 名秘鲁村民的就业问题。但如果得不到充分管制、监控管理不力或做法不可持续的话，贸易也会成为野生动植物种群的一大威胁。

非法贸易在跨国有组织犯罪集团的推动下已经形成产业规模，年产值高达 200 亿美元。他们剥夺了

犀牛数量虽然呈逐年上升的趋势，但在过去十年里偷猎活动加剧

当地人的生计和国家的收入，毁掉了当地的自然文化遗产和由此带来旅游潜力。非法贸易也会与合法贸易混在一起，就像蟒蛇皮贸易那样，给有关部门和消费者判定其合法性带来了挑战。非法贸易将许多物种推向灭绝的边缘。

我们也知道，即便过去保护工作很成功，也会面临卷土重来的威胁。这里最典型的例子就是犀牛。截至2007年，犀牛偷猎数量每年都维持在10头左右，种群数量有所增加。但去年偷猎数量猛增到1200头，来之不易的保护成果岌岌可危。

就在同一时期，非洲象盗猎数量和非法象牙贸易也出现激增。2011年曾有大约3万头大象遭到屠杀，一些种群几乎灭绝。

在这个日益拥挤、而且错综复杂的世界里，跨国犯罪集团瞄准了高价值的物种，同时人们对如何利用野生动植物也有着不尽相同的看法，在这样的情况下，我们怎样才能合法而可持续地对野生动植物加以利用？

现代的解决办法确实存在。国际社会达成了一项协议，对不可持续的野生动植物贸易和非法贸易进行监控和应对，这就是《濒危野生动植物物种国际贸易公约》（简称CITES，即《华盛顿公约》）。该公约保护的具体对象是那些在非法或不可持续的国际贸易中业已或者可能濒危的野生动植物，包括列入名录的木材、海洋和水生物种，公约将对与之相关的贸易进行严格管制。如今我们每年记录的贸易超过100万件，在必要的情况下，商业贸易也有可能遭到禁止，比如象牙和犀牛角贸易。从2017年开始，非法贸易也将有年度报告。

《华盛顿公约》一直以来得到了世界自然保护联盟（IUCN）的大力帮助。这不仅是因为1963年该组织带头力促公约的达成，更体现在数十年来该组织一直为公约决策过程提供一流的科学评估。

《华盛顿公约》通过之后，世界已经有了很大改变。在这段时间里，我们目睹了财富的飞速增加、消费和生产模式的变化、科学知识的广泛增强和技术的突飞猛进，特别是全球贸易的指数性增长。1975年以来，世界人口从40亿增加到70亿，这也意味着野生动植物产品的潜在消费者多了30亿。

尽管我们很幸运地生活在一个密切相连的世界里，但合法的交通方式被跨国犯罪分子利用来转移他们的走私品，也被旅行者们用来购买来源非法或不可持续的野生动植物制品。

为应对这些变化，《华盛顿公约》一直与时俱进，不仅推动用于追踪和认定贸易中野生动植物的新兴技术的不断发展和普及，还积极促进和强化国际打击野生动植物犯罪同盟这样的联合执法行动。

如今蝠鲼已经被纳入《华盛顿公约》的贸易控制之下。

包括锤头鲨和蝠鲼在内的海洋生物物种，以及红木等树种都被纳入《华盛顿公约》，成为新的限制贸易物种，该公约还制定了具有针对性的计划来支持缔约方将这些物种的保护落实到位。

9月，《华盛顿公约》第17次缔约方大会将在南非约翰内斯堡举行。《华盛顿公约》将考虑对近500种野生动植物品种的贸易控制措施进行改变。同时，为了确保合法贸易的可持续性以及对非法贸易的打击，还将采取一些新的改进措施。

诚然，人们的共同目的很明确，就是要确保野生动植物的存续。但说到最好的保护路径，则会有一些方法上的分歧，因此这次会议将成为《华盛顿公约》43年历史上最重要的一次。

《华盛顿公约》的决议具有真正的全球影响力，观点的分歧反映了这一事业的高风险以及公约在各国政府和观察员中所激发出的兴趣和热情。

在约翰内斯堡会议之前，更广泛的保护界人士将齐聚夏威夷参加第六届世界自然保护大会。届时来自全球的活动家、科学家和领袖们将在“站在十字路口的地球”这一主题下，就地球最紧迫的保护挑战及如何应对展开讨论。

在夏威夷会议和9月举行的约翰内斯堡会议上，这些重要的可持续性问题将引起全世界的关注。同时，我们还将探索一条路径，确保世界上的野生动植物在这个日益拥挤而错综复杂的星球上生存下去。

约翰·斯坎伦，《华盛顿公约》秘书长

How can we protect wildlife?

September will bring two crucial global conferences on the urgent issue of how best to protect endangered species

□ John Scanlon

A suit made of the ultra-fine wool of the Latin American vicuña can cost thousands, but competing demands have been reconciled, allowing species levels to rise from 6,000 in the late 60s to more than 400,000 today.

Consumers and collectors want sturgeon caviar, snakeskin bags, shark meat and fins, wild snowdrop bulbs, precious rosewood furniture, and quality agarwood oil, as well as rare birds, reptiles, cacti and orchids. But they rarely stop to think about their origins. There are now over seven billion people consuming biodiversity every day in the form of medicines, food, clothing, furniture, perfumes and luxury goods. Demand for products drawn from nature is increasing, and with it pressure is growing on some of our wildlife species.

Our capacity to harvest from the wild has no limits, and modern transport has no frontiers. There are 1.1 billion international tourist arrivals a year, 100,000 flights every day, and 500 million containers are shipped a year, allowing wildlife products to reach the four corners of the earth, legally or illegally. The tensions between boosting global trade, promoting development and conserving wildlife persist, in what sometimes seems like a set of objectives that are pulling in opposite directions.

But we can also see examples where competing demands have been reconciled, such as through well-regulated trade, under the CITES treaty, of wild animals and plants, such as in the wool of the vicuña, made into fine suits; meat of the queen conch, eaten as a delicacy; the skin of the alligator, made into watch straps; or the bark of the African cherry,

Manta rays are now being brought under CITES trade controls

> We have seen a surge in the illegal killing of the African elephant and trade in its ivory, putting certain populations at imminent risk of extinction.

turned into prostate medicine. Each has benefited both the species and local communities and their development.

Wildlife-based tourism has also greatly benefited from these strict trade controls by ensuring that the wildlife that underpins this lucrative and expanding industry is protected. The mountain gorilla is a wonderful example, where enhanced enforcement and well-managed tourism has seen gorilla numbers climbing.

In the right circumstances, trade can be an incentive for managing wildlife sustainably. It can provide positive economic benefits for local communities, as we have seen with the vicuña, where the numbers of wild animals have risen from 6,000 in the late 60s to more than 400,000 today. Close to 1,000 people in one Peruvian village alone are employed in the trade of its fine wool. But it can also be a threat to wild populations of animals and plants and their ecosystems if it is not sufficiently regulated or controlled, poorly monitored and managed, or conducted at unsustainable levels.

Illegal trade, worth up to US$20 billion (134 billion yuan) a year, is now happening at an industrial scale, driven by transnational organised criminals. It robs local people of livelihoods and countries of revenue, as well as of their natural and cultural heritage and the associated tourism potential. It can also become intertwined with legal trade, as we have seen with python skins, posing challenges for authorities and consumers in determining legal origin. It is pushing many species towards extinction.

We also know that great conservation gains of the past can come under renewed threats, as is the case with the rhino in South Africa. Rhino poaching there was stable at about 10 a year in the decade to 2007 and rhino numbers were increasing. But then poaching increased sharply to around 1,200 last year, putting these hard-won gains at risk.

Over the same period we have seen a surge in the illegal killing of the African elephant and trade in its ivory, which peaked in 2011 with an estimated 30,000 elephants being slaughtered for their ivory, putting certain populations at imminent risk of extinction.

“Illegal trade, worth up to US$20 billion (134 billion yuan) a year, is now happening at an industrial scale, driven by transnational organised criminals.”

How do we approach the legal and sustainable utilisation of wildlife in an increasingly crowded and interconnected world, where transnational organised criminals target high-value species, and where there are differing perspectives over how wildlife is utilised?

Contemporary solutions do exist. The international community has a legally binding agreement responsible for monitoring and responding to unsustainable levels of trade in wild animals and plants and to illegal wildlife trade. The Convention on International Trade in Endangered Species of Wild Fauna and Flora - CITES - deals specifically with individual species that are, or may become threatened through illegal or unsustainable international trade, including listed timber, marine and aquatic species, by strictly regulating such trade; we now record over 1,000,000 trade transactions annually. Commercial trade may also be prohibited, as is necessary, such as for elephant ivory and rhino horn, and from 2017 illegal trade will also be annually reported.

CITES has been greatly assisted by the International Union for Conservation of Nature (IUCN), which not only first promoted the need for such a treaty back in 1963, but which has continuously provided sound scientific assessments into its decision making processes.

Yet the world has changed a lot since CITES was adopted. In that time we have witnessed growing prosperity, changing consumption and production patterns, vastly enhanced scientific knowledge, phenomenal advances in technology and, above all, exponential growth in global trade. Since 1975 the world’s population has grown from four to well over seven billion people – an additional three billion potential consumers of wildlife and wildlife products.

And while we are fortunate to live in an interconnected world, legitimate forms of transport are exploited by transnational criminals to shift their contraband and by travellers purchasing illegal or unsustainably sourced wildlife products.

In response, CITES has continually evolved. Emerging technologies for tracing and identifying wildlife in trade are being developed and utilised, and cooperative implementation and enforcement efforts are actively promoted and strengthened, such as though the International Consortium on Combating Wildlife Crime.

Manta rays are now being brought under CITES trade controls.

New marine species, including hammerhead sharks and

manta rays, and timber species such as rosewood, are being brought under CITES trade controls, and well-targeted programmes to support parties implement these listings are in place.

A hammerhead shark

September will see the 17th World Wildlife Conference, or CoP17, convene in Johannesburg, South Africa. CITES will consider changes to the trade controls of close to 500 species of wild animals and plants, along with new and improved measures to ensure the sustainability of legal trade and to combat the scourge of illegal trade.

Yes, there is a strong sense of common purpose in ensuring the survival of wildlife. But there are some divergent approaches on the table as to the best path to follow, making it one of the most critical meetings in the 43 year history of the convention.

CITES' decisions have a real world impact and the differing views will be a reflection of the high stakes and the interest and passion for wildlife that CITES generates among governments and observers alike.

And on the eve of CoP17 the wider conservation community will gather in Hawaii for the IUCN World Conservation Congress, where activists, scientists and leaders from across the globe will debate the planet's most pressing conservation challenges and how to meet them under the theme "Planet at the crossroads".

The world spotlight will be fixed on these critical sustainability issues in Hawaii and Johannesburg in September, as we map out a path for the ensuring the survival of the world's wildlife on an increasingly crowded and interconnected planet.

John Scanlon is the Secretary-General CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora)

全球最大海洋公园获准设立

专家表示，虽然问题仍然存在，但南极罗斯海海洋公园的建立无疑是全球海洋生态保护迈出的重大一步。

□ 克里斯多夫·戴维

经过5年曲折的谈判，包括欧盟和24个国家在内的多方终于达成协议，在南极罗斯海设立面积为155万平方公里的海洋公园。

罗斯海海洋公园将于2017年12月正式成立，园内72%（超过100万平方公里）的海域将被划为“禁捕”区。根据协议，公园内还将设立磷虾研究区，允许研究人员在该海域内适当捕捉磷虾和鱼类以用作研究目的。

本月，南极海洋生物资源保护委员会（CCAMLR）在澳大利亚的霍巴特召开了年会。经过两周的讨论，大会最终达成了这一历史性的协议。

罗斯海是南大洋延伸至南极洲的一个大海湾，距离南极约320公里。与其他位于某一国家专属经济区内的海洋保护区不同，罗斯海的保护需要诸多国家之间达成多边协议。

南极海洋生物资源保护委员会执行秘书安德鲁·怀特透露：“一些细节还有待最终商定，但保护区的设立已经是板上钉钉。”

他还说：“这一决定表明，国际社会在大型海洋生态系统保护方面的合作达到了几乎前所未有的水平。”

罗斯海为海洋生物提供了至关重要的生境

该保护区将成为全球面积最大的自然保护区，也被视为各国通力合作维护海洋生态健康工作取得的重大成功。

“这是一个里程碑式的决议，是各国首次就大面积跨国海域的保护达成协议。”皮尤慈善信托基金分管南极和南大洋工作的主管安德烈·卡瓦纳说。

卡瓦纳认为，罗斯海是“地球上最后的原始海域之一”，这片位于南大洋的海洋是许多物种繁衍生息的重要区域。

曲折的谈判过程

2011年，美国和新西兰首先提出了在罗斯海建立海洋保护区的想法，并为之勾勒了科学基础。然而，中俄两国之前曾对该提案表示反对

并质疑大面积禁捕的合理性。

南极和南大洋联盟主管克莱尔·克里斯蒂安说："一开始中俄两国对这一提案持反对态度。为了赢得两国的同意，支持提案的一方对原始提案进行了修改。磷虾研究区的增设就是为了赢得中国的支持，而俄罗斯则更在意保护区年限问题。"

在霍巴特达成的最终协议中包括一条届满条款，规定协议有效期为35年。期满后，各国需就是否延长保护期限重新进行磋商。缺乏永久性意味着罗斯海海洋公园并不符合国际自然保护联盟关于海洋保护区的定义。此外，各国还必须为新的海洋公园建立一个监督和评估方案。

开发与保护的张力

近年来，一些高层双边会议的召开也推动了协议的达成，其中包括美国总统奥巴马和中国主席习近平的会晤。美国国务院也主动与中俄两国进行了商讨。

"国与国之间的私下协商在推动中俄两国接受保护区提案的过程中确实发挥了巨大作用。所以，罗斯海海洋公园决议的达成过程能否为其他决议所效仿，现在还很难说。"克里斯蒂安说。

她还说："海洋保护区讨论期间出现的一个主要问题在于，各国对《南极海洋生物资源养护公约》的解读大相径庭。除非各缔约国能够达成共识，否则未来其他海洋保护区的批准还可能继续面临这一问题。"

尽管该协议的达成是全球海洋保护工作的重要进步，但其他拟设立的海洋保护区仍面临着同样的障碍：如何处理各国开发利用海洋资源的利益和保护重要海洋栖息地之间的张力。

海洋保护组织海洋联合（Ocean Unite）总经理凯伦·斯拉克告诉中外对话："包括中国在内的许多国家都对大规模捕捞南极磷虾，用于提取磷虾油和生产水产养殖饲料有着极大的兴趣，但磷虾是整个南极食物链的重要组成部分，从鲸鱼到企鹅，他们的生存都离不开磷虾。"

"可以说南大洋的磷虾是全球各主要洋流的生命之源。这些洋流到达拉丁美洲和非洲的海岸后，为数以百万计的民众提供了食物和生计。"

她还说："开发利用磷虾资源也许能带来短期利益，但中国也需要认识到，严格限制磷虾的捕捞，建立更多海洋保护区，提升海洋生态系统的健康，会带来更加长远的利益。"

克里斯多夫·戴维，中外对话的执行编辑

Ross Sea park goes ahead

Historic agreement to protect part of the Ross Sea marine habitat isn't perfect, but it's a step forward for ocean conservation, experts say

□ Christopher Davy

After five years of difficult negotiations, a group of 24 countries plus the EU have agreed to establish a 1.55 million square kilometre marine park in an area of the Antarctic's Ross Sea

The Ross Sea marine park will come into force in December 2017 and will include a "no take" fishing zone that covers 72% of the reserve – over one million square kilometres. The agreement will also establish a krill research zone, in which some fishing and krill harvesting will be allowed for research purposes.

The historic agreement was reached at the annual meeting of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) in Hobart, Australia, after two weeks of discussion.

The Ross Sea is a large bay of the Southern Ocean in Antarctica that is approximately 320 kilometres from the South Pole. Unlike marine parks that are located in countries' exclusive economic zones, protecting the Ross Sea, which lies in international waters, required a multilateral agreement between countries.

Andrew Wright, CCAMLR executive secretary, said: "A number of details regarding the MPA [marine protected area] are yet to be finalised but the establishment of the protected zone is in no doubt."

He added: "This decision represents an almost unprecedented level of international cooperation regarding a large marine ecosystem."

The protected area will be the largest reserve in the world and is seen as a major success for multilateral efforts to maintain the health of the world's oceans.

"This landmark decision represents the first time that nations have agreed to protect a huge area of the ocean that lies beyond the jurisdiction of any individual country," said Andrea Kavanagh, director of Antarctic and Southern Ocean work for the Pew Charitable Trusts.

The Ross Sea is "one of the last pristine oceans left on Earth," according to Kavanagh, and this large area of the Southern Ocean provides important breeding and foraging grounds for a number of species.

Years in the making

The original proposal laying out the scientific basis for a Ross Sea marine protection area was put forward by the United States and New Zealand in 2011. China and Russia were previously opposed to the proposals and consistently questioned the justification for closing large areas to fishing.

Claire Christian, director of the Antarctic and Southern Ocean Alliance, said: "They [Russia and China] prevented the negotiations from progressing and blocked the consensus necessary for decision-making. To obtain their support, the Ross Sea proponents had to make significant changes to the proposal. For China, this meant that proponents added a krill research zone, and for Russia, it meant that a duration would need to be negotiated."

The final agreement reached in Hobart has a sunset clause after 35 years so it will need to be renewed. The lack of permanence means the marine park does not meet the definition of a marine protected area as set by the International Union for Conservation of Nature. In addition,

countries must also establish a monitoring and assessment plan for the new marine park.

Bilateral efforts

Several high level bilateral meetings have taken place in recent years to help broker the agreement, including between president Obama of the United States and president Xi Jinping of China. There were also discussions led by the US State Department with China and Russia.

"Private country-to-country negotiations played a really strong role in getting both countries on board. So it's difficult to say whether the Ross Sea decision will be a precedent for other decisions," said Christian.

She added: "One of the main issues that emerged during MPA discussions was that countries have very different interpretations of the Convention. This is likely to continue to be an issue in discussions on other MPAs until all CCAMLR countries are on the same page."

Although the agreement is an important step forward for global marine conservation, other proposed marine reserves face the same major obstacle: balancing the tension between countries' interest in exploiting marine resources and protecting critical ocean habitats.

Karen Sack, managing director of Ocean Unite, an organisation which promotes ocean conservation, told chinadialogue: "A number of countries, including China, are very interested in exploiting greater quantities of Antarctic krill for their oil and for aquaculture feed. The entire Antarctic food chain revolves around krill which are a critical building block for the diverse species from whales, to penguins."

"The Southern Ocean in turn provides the primary productivity that feeds the world's great ocean currents which run up the coasts of Latin America and Africa on which millions of people are dependent for food and livelihoods."

She added: "While China may view the exploitation of krill as something that is in its short term interest, keeping a tight cap on krill fisheries and establishing more marine reserves to rebuild or bolster the health of these ecosystems is what would be in their longer term interest."

Christopher Davy is managing editor of chinadialogue

Facebook和微信成大规模象牙非法交易工具

调查披露，有了Facebook小组和微信等社交网络工具的助长，一个越南小村子的非法动物交易规模就能达到几亿元人民币

□ 杰里米·汉斯

调查发现，在越南的一个静谧的小村庄里，野生动物走私者正在利用Facebook大量出售非法象牙、犀牛角和老虎制品。

这一发现来自野生动植物正义委员会（WJC）开展的一项为期18个月的秘密调查。11月14日至15日，WJC在海牙和平宫举行了公开听证会以公布该调查的结果，并展示Facebook等社交媒体网站如何为非法动物制品出售者提供更加便利的销售渠道。

“这是产业化的野生动物走私，”WJC执行总监奥利维亚·斯瓦克-高曼（Olivia Swaak-Goldman）表示。

过去一年中秘密调查员五次走访成为野生动物制品走私中心的越南村庄Nhi Khe，并对Facebook和在中国常用的微信进行仔细的调查。调查人员发现，这个村子中至少有51名卖家在线上或线下出售非法的野生动物制品，产品总值达到5310万美元（约合3.7亿人民币）。

除了整根的象牙以及虎骨膏，Nhi Khe的卖家在Facebook上主要出售处理过的象牙产品。

“社交媒体（为这些人）提供了一个接触客户的门面，”斯瓦克-高曼表示。

走私人员还在封闭或者私秘社交网络小组中拍卖非法动物制品，这意味着新来的买家或者卖家必须首先获得允许才能进入小组。进入小组之后，卖家就可以通过即时通讯工具与买家联系。

这样的Facebook小组还让卖家有了结识新的潜在买家的机会。支付过程通常通过微信钱包完成。

WJC调查员还发现，卖家向本地或者东南亚其他地区客户销售产品主要使用Facebook，微信则主要用来向中国的经销商批发未加工的产品。不会写中文的越南卖家通常选择通过微信语音交易。

这一方式似乎正在成为这一地区日益常见的野生动物制品走私模式。今年三月，国际野生物贸易研究组织（Traffic）宣布，Facebook已经成为马来西亚野生动植物走私者销售动物制品和活体的常用工具。这些卖家也利用在封闭和私密小组里拍卖的方式将非法活动隐藏在公众视线之外。

WJC就此事接触了Facebook。该公司一位发言人表示：“Facebook不允许用户在平台上出售和贩卖濒危野生动物制品，如果接到举报，我们将毫不犹豫地移除违反我们社区规定的内容。”

这家社交媒体巨头的社区规范规定，“禁止使用Facebook帮助或组织有害于……动物的犯罪行为”。

瓦克-高曼表示，Facebook应该采取进一步的行动，包括关闭涉事卖家账号、与执法机构合作等。

Facebook有能力删除相关账号的全部内容，但该公司却宣称，它采取怎样的行动将取决于相关涉事方违反社区规则的严重程度。至于与执法机构合作，Facebook表示自己对具体法律案件不予置评。

在Nhi Khe这个只有几千人的村子里，卖家还在线下接头开展交易。历史上，Nhi Khe是一个以木雕为生的小村庄，但近几十年来逐渐转向更为赚钱的行业，从死虎崽罐头到截下来的犀牛脚，应有尽有，WJC调查员拍摄的照片和视频清楚地记录了这一切。加之Nhi Khe位于河内以南20公里的地方，距离中越边境不算远，正是位于开展非法贸易的绝佳位置。

WJC 统计，调查过程中涉及的产品来自 907 头大象以及 225 只老虎。专家认为，其中大多数老虎都是老虎繁育场中出生的，因为如果这些死亡的老虎都是野生的，那么这个数量相当于全球野生老虎种群总数的 6%。

但是经过 Nhi Khe 流向市场的犀牛制品的数量却更加惊人。调查员统计显示，相关交易共涉及 579 头犀牛，接近去年南非被杀犀牛总数的一半。

并且这些数字还没有包括线上或线下未被调查员发现的部分。

“你能想象实际数字是多少吗？”斯瓦克 - 高曼表示。“这只是冰山一角。”

WJC 还提到，Nhi Khe 还出售熊、穿山甲、玳瑁和盔犀鸟制品。

上个月，WWF 和伦敦动物学会发布了最新版的《地球生命力报告》，指出全球正遭受野生动植物的灾难性灭绝。报告称，1970 年到 2012 年，野生动植物种群数量剧减 58%，如果任由这种形势发展下去，预计到 2020 年世界将损失三分之二的野生动植物。

如果世界遭遇第六次大灭绝，那么全球野生动植物贸易将对此负主要责任。据估计，野生动植物非法贸易总额约为 230 亿美元（约合 185 亿英镑），成为继毒品、军火和人口贩卖之后第四大非法贸易（这还是在不考虑渔业非法贸易的情况下，全球非法渔业年均规模约在 100 亿美元到 235 亿美元之间）。

过去一年中，Nhi Khe 的卖家已经停止在窗口展示货品，但他们仍然在网上明目张胆地做着生意。

“网店的页面上写着汉字‘犀牛角’、‘老虎’、‘象牙’的广告。简直就像卖汉堡一样，”斯瓦克 - 高曼说。

全球象牙雕刻和饰品的需求量很大，而东亚医药学更是将象牙视为具有治疗效果的药材。但斯瓦克 - 高曼说，老虎制品已经在很大程度上成为了男人身份的象征，而老虎制成的饰品已经成为了“越南黑帮”标准装束的一部分，“一种彰显爪牙而且略带痞气的时尚宣言”。

这种观念正在导致全球巨型动物的灭绝。老虎已经被列入世界自然保护联盟（IUCN）濒危动物红色名录。数个老虎亚种已经灭绝，而东南亚地区现存的老虎亚种（苏门答腊虎、马来亚虎和印度支那虎）全部处于灭种边缘。与此同时，2007 年到 2015 年，猖獗的盗猎导致非洲损失了 11 万头大象，可能就此将森林象推入灭绝的境地。相比于草原象，森林象受到的打击更严重。

除了与 Facebook 合作对付线上贸易，WJC 的工作重心放在越南政府上。该机构在 2015 年 7 月开始调查后立即着手与越南政府进行沟通，已经先后向五个政府机构提交了由具有资质的执法专业人士整理的上千页证据文件。

“不幸的是，我们没有收到足够的反馈，或者见到任何政府方面认真开展执法活动的迹象。我们已经表示将继续向政府方面提供支持与合作，希望能早日摧毁这个非法贩卖网络，”斯瓦克 · 高曼表示，“考虑到（政府方面）缺乏行动的事实，我们别无选择，只能在公开听证会上公布调查结果。”

专业人士一直将越南视为全球野生动植物贸易——特别是犀牛角贸易——的中心。目前，全球五个犀牛品种中有三个已经被 IUCN 濒危物种红色名录列为极危物种，而全球每年有超过 1000 头白犀牛丧生于盗猎者枪口下。盗猎还造成了人员伤亡：野保巡逻者以及盗猎者双方都有人死于枪战。

WJC 相信，考虑到通过 Nhi Khe 流向市场的野生动物产品数量之大，即便仅仅是关停这里的贩卖活动也将对遏制全球犀牛盗猎活动产生“巨大的影响”。

越南非法野生动物产品卖家如果被捕并获罪，将面临最多三年的有期徒刑。但如果贩卖活动被认为是有组织的，那么刑期可能提高到 7 年，而 WJC 认为 Nhi Khe 的贸易活动正是有组织的。不过，这一判罚相比于越南其他罪行仍然显得过轻。例如，在越南持有海洛因可能会被判处终身监禁甚至死刑。

不过，有迹象表明越南政府将建立一套新的策略应对野生动植物走私。今年 9 月，越南总理阮春福发布指令，要求地方和地区官员加大对野生动植物走私的打击力度。该国还宣布将与美国合作，共同打击全球野生动植物制品贸易。越南还在 11 月 17 日至 18 日举办了一场有关全球野生动植物贸易的大型国际会议。

虽然创立只有一年，但 WJC 已经在打击非法野生动植物贸易方面取得了一些成果：今年九月，WJC 的调查帮助马来西亚警方逮捕了 16 名野生动植物制品卖家。

斯瓦克 - 高曼表示，WJC 希望听证会将推动越南“采取切实行动”打击 Nhi Khe 的非法贸易活动。

杰里米·汉斯，英国《卫报》野生动物博客作者、Mongabay记者

Ivory smugglers use social media

An investigation reveals the social media site is acting as a shopfront for a multimillion dollar trade in animal parts, centred in a small village outside Hanoi

□ Jeremy Hance

Wildlife traffickers from a small, sleepy village in Vietnam are using Facebook to offload large amounts of illegal ivory, rhino horn and tiger parts, an investigation has revealed.

The results of an 18-month sting by the Wildlife Justice Commission (WJC) – shared with the Guardian – were presented at a public hearing in November at the Peace Palace in the Hague. They showed how social media sites such as Facebook are allowing traders greater access to customers.

"It's wildlife trafficking on an industrial scale," said Olivia Swaak-Goldman, the executive director of the WJC.

Undercover investigators visited the Vietnamese village of Nhi Khe, known as a wildlife trafficking hub, five times in the past year and scoured Facebook and WeChat, which is popular in China. In all, they tallied illegal wildlife products worth US$53.1 million (366.6 million yuan) stemming from just 51 traders in the village for sale in person and online.

Nhi Khe traders are primarily using Facebook to sell processed ivory products. But even whole ivory tusks and tiger bone paste have been sold on the platform.

"Social media provides a shopfront to the world," Swaak-Goldman said.

Social media provides illegal ivory traders with a global shopfront

Items are being sold in closed or secret groups through auctions, which means new buyers or sellers have to be approved before being allowed into the group. Once in, traders will use instant messaging to keep in touch with buyers.

Such Facebook groups are also allowing traders to meet a wide array of potential new buyers. Payment is usually done via WeChat Wallet.

WJC investigators have found that Facebook is primarily used by traders to sell wares locally or across other parts of Southeast Asia. In contrast, traders use WeChat to sell unprocessed products in bulk to Chinese traders. Since Vietnamese traders aren't able to write in Chinese, they tend to offer products on WeChat via voice message.

This appears to be a widening pattern for wildlife traffickers in the region. In March, Traffic, another anti-wildlife trade organisation, announced that Facebook had become a popular tool for selling both animals parts and live animals with wildlife traffickers in Malaysia. These traders also use auctions in closed and secret groups to keep their illegal activities out of the public eye.

A beaded elephant bone and ivory bracelet, advertised for sale on Facebook and identified by the WJC

The WJC approached Facebook about the issue and a spokesperson from the social media group told it: "Facebook does not allow the sale and trade of endangered animals and we will not hesitate to remove any content that violates our community standards when it is reported to us."

The social media giant's community standards "prohibit the use of Facebook to facilitate or organise criminal behaviour that causes physical harm to … animals".

Swaak-Goldman said Facebook needs to go further, including shutting down traders accounts and cooperating with law enforcement.

Facebook has the capacity to delete posts or entire accounts, but the group said how it reacts depends on the severity of the breach in community standards. As to working with law enforcement, Facebook said it would not comment on specific legal cases.

Sales are also continuing in person in Nhi Khe, which is home to just a few thousand people. Historically, Nhi Khe was a village of wood carvers, but in recent decades its economy has shifted towards this more lucrative trade, dealing in everything from dead baby tigers in a jar to sawed-off rhino feet, as documented in photos and videos taken by WJC investigators. The village is perfectly situated for the illicit trade, being 20 kilometres south of Hanoi and not far from the Chinese border.

Throughout the investigation, the WJC tallied products representing up to 907 dead elephants and 225 dead tigers. Experts believe most of the tigers were born in tiger farms because if they were coming strictly from wild tigers, it would represent nearly 6% of the world's population.

But even more surprising was the amount of rhino material passing through Nhi Khe. Investigators detailed rhino parts from 579 individual rhinos, nearly half of the total amount of rhinos killed in South Africa last year.

And these numbers don't take into account products not directly seen by investigators either via social media or in person.

"Can you imagine what the real number is?" said Swaak-Goldman. "This is the tip of the iceberg."

The WJC also noted products in Nhi Khe that were from bears, pangolins, hawksbill sea turtles and helmeted hornbills.

In October, WWF and the Zoological Society of London released an update of the Living Planet Report that found the world is suffering a catastrophic loss in global wildlife. According to the report, wildlife populations fell by 58% from 1970-2012 and we are on track to lose two-thirds of

wildlife populations by 2020.

The global wildlife trade is playing a leading role in what could become the world's sixth mass extinction event. The illicit trade is estimated to be worth around US$23bn (158 billion yuan), making it the fourth largest illegal trade after drugs, arms and human trafficking (and that's not including illegal fisheries, worth between US$10 billion and US$23.5 billion annually).

Over the past year, Nhi Khe traders have stopped showing their products in windowed store fronts, but the trade remains brazenly open, even more so than online.

"On the front [of the shops], it advertises in Mandarin 'rhino horn', 'tiger', 'ivory'. It's like buying a Big Mac," Swaak-Goldman said.

Ivory is in high demand worldwide for carvings and decorations, while rhino horn is believed, against all evidence, to be a curative in eastern Asian medicine. But Swaak-Goldman said tiger parts have largely become a status symbol for men. They are a part of the "Vietnamese gangster" look, she said, adding that wearing the body parts of a dead tiger is "a fashion statement with its claws and its slight hoodlumism".

Such beliefs are killing off the world's megafauna. Tigers are listed on the IUCN red list of endangered species. Several tiger subspecies are already extinct and all those remaining in Southeast Asia (Sumatran, Malayan and the Indochinese) are on the verge of extinction. Meanwhile, Africa has lost 110,000 elephants from 2007-15 due to an epidemic of poaching, potentially putting forest elephants – which have been harder hit than savannah elephants – at risk of annihilation.

While the WJC is working with Facebook to combat the trade online, its biggest target is the Vietnamese government. The WJC began communicating with the government as soon as it launched the investigation in July 2015. Since then, it has handed over thousands of pages of evidence prepared by qualified law enforcement professionals to five government agencies.

"Unfortunately, we have not received an adequate response or seen indication of serious law enforcement activity. We have continued to offer our support and co-operation to dismantle this network," Swaak-Goldman said. "Given this lack of action [by the government], we have no choice but to present this investigation at a public hearing."

Experts have long viewed Vietnam as a hub for the global wildlife trade, especially in rhino horn. Today, three of the world's five rhino species are listed as critically endangered by the IUCN red list, while the world is losing more than 1,000 white rhinos a year to poachers. Poaching has also taken a human toll: both wildlife rangers and poachers are sometimes killed in gunfights.

A trader in Vietnam shows off his tiger claw necklace, gun and other spoils of the trad

The WJC believes simply shutting down the trade in Nhi Khe alone could have a "significant impact" on global rhino poaching, given the staggering amount of product moving through the village.

If caught and convicted, illegal traders in wildlife products in Vietnam face up to three years in jail. But the sentence could jump to seven years if the trade is deemed organised, which the WJC asserts is the case in Nhi Khe. Still, this is lower than other crimes in Vietnam. For example, possessing heroin in the country can lead to a life sentence or the death penalty.

But Vietnam has shown some signs of creating a new strategy on wildlife trafficking. In September, Prime Minister Nguyen Xuan Phuc issued a directive urging local and regional officials to step up the fight against wildlife trafficking. The country has also announced a partnership with the US to combat the global trade. Vietnam organised a major international conference on the global wildlife trade in November.

Although only a year old, the WJC has already had success combating the illegal wildlife trade: an investigation resulted in the arrest of 16 wildlife traders in Malaysia in September.

Jeremy Hance is a wildlife blogger for the Guardian and a journalist with Mongabay.

中国碳市场进入冲刺阶段

全世界最大的碳市场将在2017年于中国启动，虽然减排效果不会立即展现，但巨大的交易规模足以令人期待它的未来。

□ 张 春

在拒绝承认气候变化的特朗普当选美国总统后，将于 2017 年启动的中国全国碳交易市场格外令人瞩目。中国的这一举措这不仅是中美双边气候谈判最重要的成果之一，或许也是巴黎协定生效后最受关注的国家气候行动之一。

多位专家告诉中外对话，中国碳市场不会一开始就达到完美，还需要几年的成长时间来逐渐展现其减排效果，而当下最重要的是迅速建立市场机制，然后在运行中学习、完善。

规模空前

毋庸置疑，中国全国碳市场最引人关注的是其史无前例的交易规模。简而言之，2017 年中国碳市场启动初期的年度分配碳配额总量规模大约在 30 亿 -50 亿吨，比当前全球最大的碳交易市场欧盟碳交易市场（EU-ETS）的 20 亿吨左右要大很多。2015 年全球 80% 的碳交易都发生在欧盟碳市场，中国碳市场的加入将极大改变这一局面。

根据国家发改委今年 1 月下发的通知，首批进入全国碳交易市场的企业限定在石化、化工、建材、钢铁、有色、造纸、电力、航空八大行业。这些行业中的企业，只要年耗能达到 1 万吨标准煤及以上就必须参加碳交易。经过核算，有七千多家企业符合要求，碳排放总量大约占到全国一半。

发改委应对气候变化司副司长蒋兆理透露，2017 年第一季度或第二季度将完成配额分配，然后碳市场就将全面启动。

蒋兆理还表示，碳市场启动初期价格可能为现在 7 个试点市场的平均水平（约 30 元 / 吨），现货交易量大约为 12 到 80 亿元 / 年。但 2020 年之后，碳期货等多元产品会逐渐纳入，预计交易额规模可能增加到 600 亿到 4000 亿元。并且，交易也将扩展到八大行业之外，并纳入年能源消耗在 5000 吨标煤以上的企业。

边做边学

目前中国有 7 个区域性碳市场试点，布局在地理位置和经济水平差异较大的内地和沿海区域，到 2015 年底涵盖了超过 2000 家企业，年发放配额总量达到 12 亿吨。

与欧盟碳市场近 6 年的前期准备不同，中国的碳交易区域试点在接到发改委通知两年之后即启动。2013 年底，北京、上海、广州、深圳和天津试点市场开始操作，武汉和重庆也在几个月内启动试点。也就是说，时间最长的试点市场也只有 3 年运营经验。

试点项目显示不同地区的试点运作状况存在明显的差异。一方面，不同地区碳市场的成交价格差异较大。北京环境交易所总经理梅德文介绍，只有北京的碳价格是稳定在 50 元 / 吨左右，广州和武汉的碳价格则只有 10-20 元。

另一方面，不同市场的规范化水平差异也不小，体现出不同区域间市场经济发展水平的差距。磐石环境与能源研究所的林佳乔认为，重庆和湖北碳市场就明显体现出培训的不足，企业既没有真正理解碳市场，对待排放数据也不够认真。相比较而言，上海市场的机制设计和企业培训方面就做得很不错，值得其他市场借鉴。

对于交易量规模翻了几十倍的

全国碳市场，蒋兆理提出，试点工作得到的一条重要经验，就是法制越完善，碳市场秩序越好。

目前规范碳市场的是2014年颁布的《全国碳排放权交易的管理暂行办法》，只是发改委的部门规章，约束力较低。正在拟定中的《全国碳排放交易管理条例》为国务院条例，具有更高的约束力。

但也有专家认为可以边做边学，在实践中逐渐完善碳市场规则。碳交易咨询公司中创碳投战略总监钱国强表示，全国碳市场的前3年可以算是试运行，不必对初期碳市场可能出现的问题过于担忧。

“你不让一个孩子下水而天天对他讲怎么游泳，他是学不会的。市场一旦起来了，它会发现问题，自己去纠正完善。如果不启动很多问题你不知道，永远讨论不完，对现实没有帮助。”钱国强告诉中外对话。

配额分配的学问

排放配额的计算和分配是维持合理碳价的关键因素，也许也是一个碳市场最重要的规则——欧盟碳市场出现的配额过剩而碳价格大幅下跌的状况证明了这一点。钱国强认为，欧盟碳市场是通过立法制定今后多年的碳配额分配方式，制定以后修改很难；中国采用的则是每年根据产量调整一次配额的方法，留有调整改善的余地。

中国碳市场的配额分配法，具体来说，是一种动态的基于行业基准线的配额分配方式。行业基准线是该行业要达到减排目标需要实现的排放强度，在实践中，这一系数将参照行业减排表现领先企业的抽样数据计算获得。企业将自身产量乘以碳市场管理者公布的当年基准排放强度，就可以大致预估当年将获得的配额。

钱国强告诉中外对话，中国全国碳市场也借鉴欧盟经验，有市场稳定储备（MSR，Market Stability Reserve）的机制设计，用以调节碳市场的流动性，即在市场配额过剩时收回，而在市场配额紧缺时放出。不过具体的操作办法还要等完整的细则出台才知道。

相比配额的分配，钱国强更关心全国排放数据的积累，因为行业基准线的配额分配办法的优劣，取决于所获取的数据的质量和完整性。由于数据的积累需要一定的时间，全国范围内采用基准线法进行配额分配，大约要等到2020年才能完善。

减排效果将逐渐体现

目前中国碳市场面临的一大问题是初期交易碳价可能过低，以及由此导致的减排效果不明显。蒋兆理提到，为了给企业一些适应的时间，预期碳市场启动初期的配额分配会相对宽松，相应的，碳定价在市场启动初期预计在30元每吨左右。这一预测低于目前北京和深圳试点碳市场40-50元的平均成交价。

北京碳交易所总经理梅德文认为，如果碳配额分配过于宽松，企业就没有动力进行交易，碳价格上不去，这不利于市场的良性发展。“碳市场的作用就是通过价格机制引导碳排量这个稀缺产品的交易，如果价格过低，就无法形成交易，”梅德文表示。

蒋兆理告诉中外对话，只有碳价达到200-300元每吨，企业才能够真正感受到减排的压力，而他预计中国碳市场的成交价2020年后才能达到这一水平。那也就意味着，要到2020年之后，碳市场的减排作用才会显现。

全国碳市场将实行的中央和地方两级管理制度也令人对可能出现的地方保护主义有所担心：中央政府负责制定企业碳排放的核算标准，配额分配的基本原则，监督管理相关的第三方核查机构和交易平台，但中央政府不会直接向任何一家企业分配配额，而是由地方政府执行。

另外，值得注意的是，中国碳市场的碳减排目标是碳强度的下降而非绝对减排量，这一方面保护了中国企业参与碳交易的积极性，另一方面也令人对碳市场的实际减排效果有所顾虑。

蒋兆理认为，碳市场是推动减排的诸多手段之一，在理想状况下，碳市场可以和能源政策、经济政策、环境气候政策相互配合，一同发挥作用。

他认为，目前中国碳市场对于能源结构转型的作用还相对有限，在它至少会推动企业向同一行业内的减排优等生看齐；而由于中国大部分的碳排放量都将被全国碳市场覆盖，“碳市场对于中国承诺的碳排放2030年左右达峰，碳强度到2030年下降60%-65%还是会有重要的贡献。”

张春，中外对话高级研究员

China to open carbon market

No immediate emissions reduction is expected when it opens next year, but its huge scale provides hope for reductions from 2020 onwards

□ Zhang Chun

In the wake of Donald Trump's surprise victory in the US presidential election, and his refusal to recognise climate change, China's new carbon market is attracting particular attention. China's move is not just one of the most important outcomes of the US-China bilateral climate talks – it may be the most watched national climate change move since the Paris Agreement came into force.

In the short-term, experts are not expecting China's national carbon market to be perfect. They say it will take several years of growth before it delivers emissions reductions, and that the most urgent task is to put the market mechanism in place quickly so that its operation can be studied and improved.

China's nationwide carbon market will be the largest in the world when it begins trading next year

Unprecedented scale

The new market has received significant attention due to its nationwide scale and unprecedented size, which is expected to be in the range of 3-5 billion tonnes of carbon allowances per year initially. This is much larger than the EU-ETS scheme, which is currently the largest carbon market, with two billion tonnes of allowances. In 2015, 80% of all carbon trading worldwide took place on the EU market. The new Chinese market will change that.

According to a document issued by the National Development and Reform Commission (NDRC) in January, the market will at first be restricted to firms in eight sectors: petrochemicals, chemicals, building materials, steel, ferrous metals, paper-making, power-generation and aviation. Any firm in these sectors using more than 10,000 tonnes of standard coal equivalent (TCE) of energy annually must participate in the market. Over 7,000 such firms have been identified, accounting for about half of all China's emissions.

Jiang Zhaoli, deputy head of the NDRC's climate change department, revealed that allocation of carbon allowances will be completed in the first half of 2017, after which the climate market will be launched.

Jiang also said that launch prices may be set as the average of the prices on China's seven trial carbon markets (about 30 yuan per tonne), which will mean between 1.2 and 8 billion yuan (US$0.17-1.16 billion) of over-the-counter trading annually. But after 2020, more varied products, such as carbon futures, will be introduced, with market trading expected to expand to between 60 and 400 billion yuan (US$8.7-58 billion) a year. Trading will also be expanded to other sectors, and to firms using 5,000 TCE per year.

Learning as you go

China currently has seven regional carbon trading trials that are spread across the developed eastern coast and less affluent inland areas. By 2015, these covered 2,000 firms, with annual carbon allowances totalling 120 million tonnes.

Unlike the EU market, which was in preparation for six years, China's trial carbon markets launched only two years after instructions from the NDRC. At the end of 2013, trial markets went into operation in Beijing, Shanghai, Guangzhou, Shenzhen and Tianjin, with Wuhan and Chongqing following several months later. This means even the longest-running of the trial markets has only three years' experience.

The trials have revealed significant differences in performance across regions. One aspect of this is the carbon price. Mei Dewen, head of the Beijing Environment Exchange, said that prices are only stable in Beijing – at about 50 yuan per tonne – whereas in Guangzhou and Wuhan prices are as low as 10-20 yuan.

There are also important differences in the participation of firms in the carbon markets, which is demonstrated in the varying levels of market development. Lin Jiaqiao, of the Rock Environment and Energy Institute, thinks that in Chongqing and Hubei, in particular, there has been insufficient training. This has resulted in companies not fully understanding carbon trading, and providing inaccurate emissions data. This compares with Shanghai, where market design and company training have been very good – something that other markets could learn from.

As for the nationwide market, which will be orders of magnitude larger than the trials, Jiang pointed out that the trials have shown markets are more effective when the rule of law is stronger.

Currently, the rules applicable to carbon markets are the NDRC's 2014 Temporary Measures for Management of National Carbon Trading Markets. However, as the NDRC's departmental level rules are weak, it is expected that State Council regulations, the Regulations for Management of National Carbon Trading Markets, which are currently being drafted, will have more force.

But some experts say it is possible to learn as you go, gradually improving the market rules as required. Qian Guoqiang, strategy director for carbon trading consultancy SinoCarbon, said that the first three years of a national carbon market should be regarded as a trial period, and there is no need to be overly worried about problems arising during this time.

Qian told chinadialogue: "You don't just throw a child in the water and tell him how to swim; he won't learn. When the market gets started it'll identify problems, then it'll adjust and improve. There are lots of problems you won't find until it's launched – you could discuss it for ever, but that's no real help."

Allocation of allowances

The calculation and allocation of carbon allowances is key to maintaining a reasonable carbon price, and perhaps the

most important part of a carbon market – as shown by the EU carbon market, which has seen a surplus of allowances and plummeting prices. Qian Guoqiang says the EU used legislation to set allowances for years into the future, making ongoing adjustments difficult. China will adjust allowances annually based on output, leaving room for improvements to be made.

Specifically, China is to allocate allowances dynamically, based on sectoral baselines. The sectoral baseline is the carbon intensity a specific sector must reach if it is to hit its emissions targets. In practice, baselines will be established on the performance of a sample of leading firms in each sector. Companies can multiply their own output by baseline emissions intensity for the year, as published by the market managers, and estimate their allowance for that year.

Qian told chinadialogue that China's national carbon market has learned from the EU market in the design of its market stability reserve (MSR). The reserve maintains liquidity in the market by buying back allowances when there is a surplus and selling them during a shortage. However, the specifics of how this will work have not been published yet.

Qian is more worried about acquiring national emissions data than he is about allocation of allowances. The success of the sectoral baseline method depends on getting full and accurate data. Gathering that data takes time, and it will be around 2020 before it is possible to use the method nationwide.

Gradual impact

One problem that could be faced in early trading is too low a carbon price that will fail to adequately incentivise emissions reductions. Jiang Zhaoli pointed out that early allowances will be generous so that companies have time to adapt, and that the initial carbon price will be about 30 yuan per tonne. That is lower than the current price on the Beijing and Shenzhen exchanges, of 40-50 yuan.

Mei Dewen, head of the Beijing Environment Exchange, said that if allowances are too generous, companies will have no reason to trade, and low carbon prices will hamper the healthy development of the market. "The role of carbon markets is to use pricing mechanisms to bring about trading of emissions allowances, a scarce product. If prices are too low, there won't be any deals."

Jiang Zhaoli told chinadialogue that companies won't feel any real pressure to cut emissions until the carbon price hits 200-300 yuan, and he doesn't expect that to happen until after 2020. That means the market won't contribute to emissions reduction until later than 2020.

There are also concerns that the two-track management system for the markets, which will see roles for both central and local government, could lead to local protectionism: central government will determine how companies' emissions are calculated and the basic principles for the allocation of allowances, and supervise third party auditors and the trading platforms – but actual allocations will be handed out by local government.

It is also worth noting that China's carbon market aims to achieve a drop in carbon intensity, rather than absolute carbon emissions. This will ensure China's firms are willing to participate in the market, but it also gives rise to worries about how much actual impact it will have on carbon emissions.

However, Jiang Zhaoli argues that carbon markets are just one of many ways to reduce emissions. Ideally, the carbon market will work in concert with energy, economic, and environmental and climate policy.

He added that China's carbon markets currently play only a limited role in promoting a low carbon energy transition, but will, at least, encourage firms to catch up with the best performers in their sector. And as the bulk of China's emissions will be covered by the national market, "Carbon markets will make a major contribution to China's commitments of reaching a carbon peak around 2030 and reducing carbon intensity by 60%-65% the same year."

Zhang Chun a senior researcher at chinadialogue.

电力十三五：别只盯着装机容量

虽然意在扩大煤电装机电力五年规划令人担忧，但当务之急是减少现有可再生能源电力的浪费

□ 侯·安德　莉迪亚·麦克马伦-莱尔德

上月初，中国电力部门公布了备受关注的五年发展规划，该规划由于意在扩大煤电装机并减缓可再生能源的增长，受到了环保界的批评。但随着中国经济进入增速放缓的“新常态”，真正应该关注的是效率。与装机容量相比，效率更能体现中国清洁能源转型的情况。

中国国家能源局（NEA）发布的这份电力发展规划是《中华人民共和国国民经济和社会发展第十三个五年规划（2016-2020）》下的一个专项规划，提出了电力部门在政策制定、政府开支和项目规划方面的具体指导方针和目标。该规划出台后，有关风电、水电以及电网发展的“十三五”规划也相继出台。

制定五年规划要经过大量行政步骤，还要平衡煤炭行业等地方利益集团之间的冲突。规划提出的目标勾勒出能源行业发展的大致路线。但中国曾在两个五年规划之间调整过能源发展目标，所以，现在的目标也有可能在今后几年作出调整，以便在2020年之前实现更加宏伟的目标。

2020年电力规划中风力和太阳能装机量比预计要少，但提出了提高能源利用率的要求

扩大煤电装机容量

该规划最遭人诟病之处在于不顾煤电产能过剩以及电力需求萎靡的现状，提出投建新的燃煤电站。中国2020年的煤电装机目标从现在的9.2亿千瓦增长至11亿千瓦，这意味着虽然会淘汰一些旧的装机，但未来4年内每年仍会有4500万千瓦的新增煤电入网。每新增100万千瓦的煤电就意味着17.5亿美元的不必要支出。而这笔钱最终所购买的物质资源和劳务本来可以投入到清洁能源、私营部门服务以及技术创新等生产力更高、更能够推动未来经济发展的经济活动上。

新目标似乎与之前呼吁多个省份设定煤炭消耗上限、要求中国大部分地区设置燃煤电厂新建数量区域“红线”的政策相矛盾。

然而，煤炭产业是各省的重要收入来源，因而中国仍在增加煤电装机的决定也并不令人惊讶。虽然中国正在大力削减煤炭消耗（根据中国国家发展和改革委员会数据，2016年前8个月中国煤炭消费持续下降），政府税收仍旧是重中之重。

无论是从环境角度还是经济角度来看，彻底停止新建燃煤电站审批都是最理想的做法，但是目前决策者并不认为这一做法可行。与此同时，目前已有约 2-3 亿千瓦的煤电装机获准投建或正在建设中。因此，国家能源局表示即便将煤电装机控制在上调后的 2020 年目标之内也将会有困难。虽然政府早就意识到了产能过剩的问题，但限制国有电力公司燃煤电站的建设依旧面临挑战，这暴露了体制层面过度投资发电资产的倾向。

然而，更高的煤电装机目标并不意味着中国实际燃煤量会更高。效率更重要，要确保在优先调用高效电站的同时，逐步淘汰低效电站。

可再生能源增长放缓

该规划第二个让人不满的地方在于调低了风能和太阳能等清洁能源的增速目标。原先市场预期 2020 年的太阳能光伏装机为 1.5 亿千瓦（目前约为 6500-7000 万千瓦），但新规划把这一目标降低到了 1.1 亿千瓦。风电方面，政府高层领导之前的讲话曾表示，风电装机将从目前的 1.5 亿千瓦增长至 2020 年的 2.1 至 2.5 亿千瓦。新规划确定的 2.1 亿只达到下限。

虽然调低清洁能源目标的举动看似令人失望，但我们必须注意到，中国经济增长放缓，以及经济结构向以消费、服务业为主导的模式转型，将会对未来的能源需求和实际能源消费造成深远影响，无论预计装机容量是多少。

专注扩大装机容量在国家快速工业化时期确实合情合理，这一阶段电力短缺问题快速浮现，国家电力部门必须大力扩大产能以满足经济发展带来的巨大能源需求。可再生能源装机容量发展热潮也推动了风能和太阳能产业规模的迅速扩大，帮助实现了这方面技术的成熟和价格的下降。

但目前，随着中国经济进入新常态，在省级或者监管层面，效率往往比装机容量更重要。由于发展步调不一、电力调配存在问题，以及激励措施错位，中国有多达 20% 的清洁能源被浪费。这就解释了为什么中国的风能装机远高于美国，但实际风电产量却小于美国。

好消息是，中国最新的电力“十三五”规划明确要求在 2020 年之前将弃风弃光率降至 5% 以下。国家能源局最新发布的《风电发展“十三五”规划》不仅进一步制定了各省的装机目标，还明确了风电产量（不仅仅是装机容量）目标。规划为中国北部各省，即目前弃风现象严重的“三北”（西北、华北及东北）地区省份明确设定了风电装机总量上限，其余各省则制定最小装机目标。规划表示，“三北”地区以外省份未来新增的风电装机将占新增风电装机总量的 57%，而“三北”地区将在 2020 年之前基本解决弃风问题。

粗略的计算一下就能发现，对于风电部门而言，上述战略并非如听上去那么糟：2015 年，中国风电发电量为 1860 亿千瓦时，弃风率 15%。假设 2020 年风电装机扩大为 2.5 亿千瓦而各省份的风电利用小时数保持不变，即弃风率不增不减，则全年发电量为 4100 亿千瓦时。规划中新的装机目标为 2.1 亿千瓦，同时要求各省将弃风率降至 5% 以下，并增加“三北”地区以外弃风率低的省份的风电装机 。假设这些目标顺利实现，2.1 亿千瓦的装机容量将生产 4000 亿千瓦时的电量，相比 2.5 亿千瓦装机目标的产量相差无几，成本仅为其 84%。相比而言，《风电发展“十三五”规划》要求 2020 年的风电发电量达到 4200 亿千瓦时（要想实现更高的产量，可以借助规划中提到的扩大涡轮机、发展海上风电等措施。这些措施都将在现有风电站的基础上进一步扩大电力生产。）

为了实现上述目标，中国需要制定清晰的计划，加强各部门之间的协调，整合各种能源，提高市场效率。近几个月来，中国迅速推出了多项举措，如设立双边能源交易试点、新的区域能源交易中心（包括京津冀地区设立的能源交易中心），以及大力发展可再生能源现货市场等。中国预计将于明年启动全国碳交易市场，并对小型排放者征收环境税。中国新近发布的风电发展及电网公司五年规划也涵盖了综合规划以及加强区域可再生能源消纳方面的内容。推行这些改革绝非易事，可能会与长期以来阻碍能源市场改革以及可再生能源消纳的制度诱因相冲突。

未来，装机容量和目标或将成为衡量中国能源转型是否顺利最不重要的指标。相反，中国可以花更大的力气厘清如何使各能源相关机构、目标以及政策之间相互协作，共同创建一个更加高效的能源系统，加速清洁能源转型。

侯·安德，保尔森基金会中国研究副主任

莉迪亚·麦克马伦–莱尔德，环境记者，中外对话北京办公室图文制作人

Looking beyond the gigawatts

The plan for new coal capacity is unfortunate but the priority is utilising existing renewables efficiently

□ Anders Hove Lydia McMullen-Laird

China's highly anticipated electricity sector five-year plan was released earlier last month but was criticised by the environmental community because it targets increased coal power capacity and slower growth for renewables. But as China's economy adjusts to the "new normal" of lower economic growth, it is efficiency that should be the focus because this matters more than capacity as an indicator of China's clean energy transition.

The electricity sector plan, released by China's National Energy Administration (NEA), is a subsidiary of the 13th Five-Year Plan for Economic and Social Development (2016-2020) and delivers specific guidelines and targets to inform policy making, government spending and project planning in the power sector. Subsequently, five-year plans for wind, hydro, and grid companies have also been released.

The development of China's five-year plans is a bargaining and bureaucratic process within the political system that includes local interest groups such as the coal industry. Although the targets set an approximate trajectory for the power sector, China has adjusted energy targets between five-year plans in the past, and will have the opportunity to revisit these targets over the coming years to increase ambition by 2020.

Increasing coal capacity

One major criticism of the plan is its call for new coal plants, in spite of existing coal overcapacity and flat power demand. China's 2020 target for coal capacity of 1,100 gigawatts, an increase from 920 gigawatts, implies that as much as 45 gigawatts per year of additional coal power will come online over the next four years, though some old capacity will be retired. Each new gigawatt of coal energy represents as much as US$ 1.75 billion in unnecessary spending, which ultimately pays for physical resources and labour that could be allocated to more productive activities in the economy. Alternatives include investment in cleaner energy or in private sector services and technology innovation, the country's future economic drivers.

The new target appears to contradict policies calling for many provinces to cap coal consumption and for large areas of China to set regional "red line" limits on new coal plants.

However, it is not surprising that China is still adding coal capacity given the importance of the coal industry to provincial revenue. Although China is making great strides in reducing coal consumption – coal use fell in the first eight months of 2016, according to the National Development and Reform Commission – government revenue is still the top priority. While completely eliminating approval of new coal plants would be ideal, both economically and environmentally, policymakers do not yet see this as a realistic option. Meanwhile, with some 200-300 gigawatts of coal capacity already given approval or under construction, the NEA has said that staying under the new, higher, 2020 coal power target will still be a challenge.

The idea that limiting coal plant construction by state-owned power companies is challenging, even when the government has recognised the overcapacity problem for years, lays bare the systemic biases that favour over-investment in generation assets.

Crucially, the higher capacity target for coal won't

necessarily determine how much of it China actually burns. What matters more is the efficiency of the power system as a whole, and ensuring that the most efficient power plants are given dispatch priority while the less efficient ones are phased out.

Renewables slowdown

A second criticism of the plan is it sets a slower growth rate for clean energy such as new wind and solar. Originally, the market expected 150 gigawatts of solar PV for 2020 (up from around 65-70 gigawatts today), but the new plan sets the 2020 target at 110 gigawatts. Similarly, speeches by top officials had suggested an increase from today's 150 gigawatts of wind capacity to 210-250 gigawatts by 2020. This has been revised downwards to 210 gigawatts, the lower end of the government's earlier guidance.

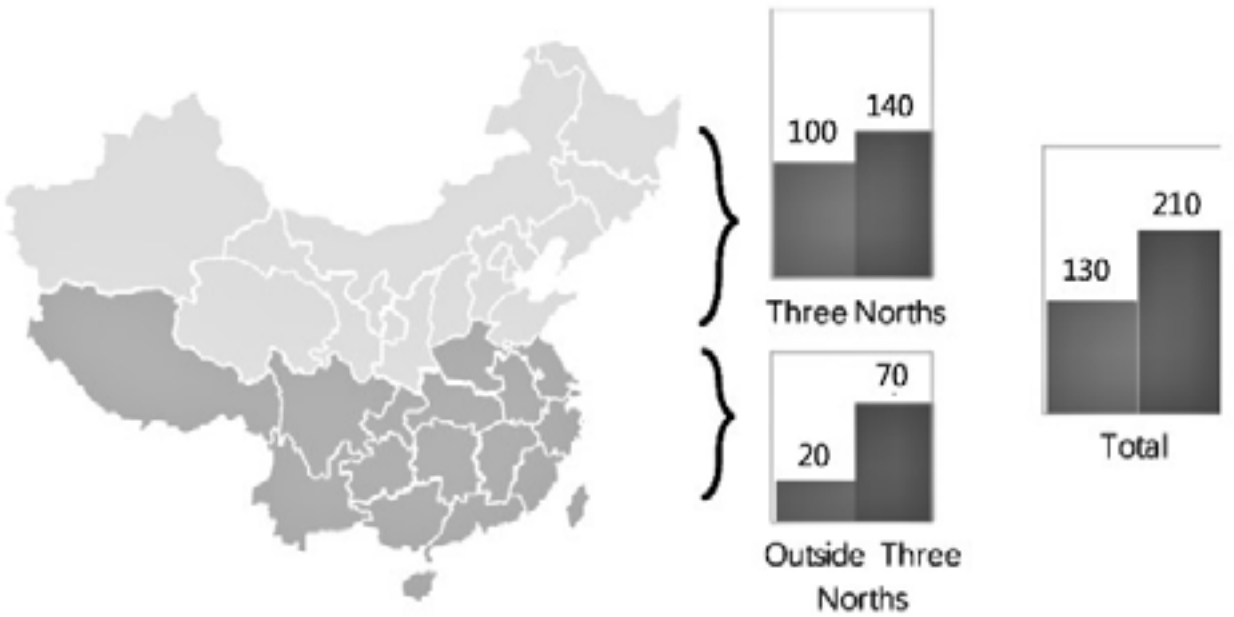
As disappointing as the lower capacity targets may seem, it's important to note that China's economic slowdown, along with structural changes to the economy towards a more consumer- and services-focused model, will have a profound impact on future demand and actual energy use, regardless of forecast capacity requirements.

Focusing on capacity made sense during the country's period of rapid industrialisation, when electricity shortages could emerge quickly and China's state-owned power sector needed to be pushed forward aggressively to meet the economy's enormous need for power. The rush for capacity in renewable energy also helped scale up wind and solar quickly, helping the technologies mature and costs to fall.

But today, as China's economy adjusts to the new normal, what matters more than capacity is efficiency, often at a provincial or regulatory level. Because of poorly coordinated development and distribution, as well as misaligned incentives, China wastes as much as 20% of the clean energy it produces. This wastage helps to explain why China produces less energy from wind than the US despite having significantly more installed wind capacity.

The good news in China's latest Five-Year Plan is that it sets a clear quantitative target for reducing such wastage, called curtailment, below 5% by 2020. China's newly released 13th Five-Year Plan for the wind sector further sets out targets for capacity by province, while also specifying a target for wind energy output – not just capacity. The plan specifies a maximum limit for new capacity in each province in the northern half of China, known as the "three norths", where wind power is severely curtailed at present. Elsewhere in China, the NEA has assigned minimum capacity targets by province. The plan states that 57% of new wind capacity will be installed in provinces outside the "three norths" and that the "three norths" provinces should largely resolve wind curtailment problems by 2020.

A quick calculation shows why this strategy isn't as bad for the wind sector as it sounds: In 2015, China's



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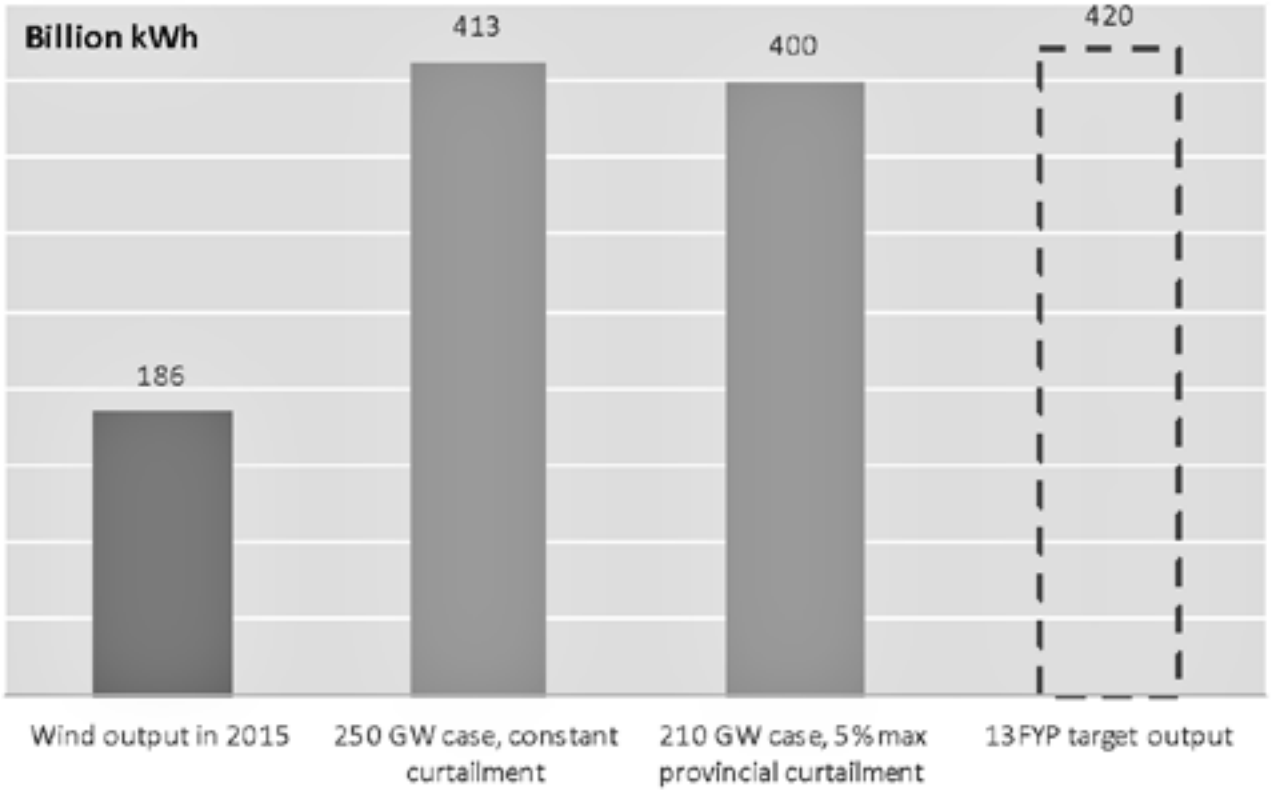
Wind capacity: year-end 2015 and 2020 target (gigawatts)



2020 wind production targets under three scenarios, compared to 2015 output

© Paulson Institute calculations

wind sector produced 18.6 billion kilowatt-hours, with curtailment of 15%. Assuming capacity increased to 250 gigawatts nationwide by 2020 and that the level of curtailment remained the same, 410 billion kilowatt-hours would be produced over a full year. China's new capacity target is 210 gigawatts, but includes measures to reduce curtailment below 5%, and shift new additions to provinces outside the "three norths" that currently have little curtailment. Assuming these targets are realised, 210 gigawatts would produce 400 billion kilowatt-hours, just slightly less than the 250 gigawatts base case, but at only 84% the cost.

For comparison, the 13th Five-Year Plan for wind calls for the wind sector to produce 420 billion kilowatt-hours in 2020. This goal includes measures such as larger turbines and deployment of offshore wind.

To meet these goals, China needs clear plans and better coordination between agencies to integrate the country's diverse energy sources into an efficient market. In recent months there has been a rapid roll-out of bilateral power trading pilots, new regional power trading centres (including in the Beijing-Tianjin-Hebei region), and efforts to develop spot markets for renewable energy.

Next year, China is expected to launch a nationwide carbon trading market, and environmental taxes for smaller emitters. And China's newly released five-year plans for the wind and power grid companies consider integrated planning and improvements to renewables integration at the regional level. Implementing these reforms will not be easy, and may conflict with long-established institutional incentives that have hindered power market reforms and renewables integration.

Looking ahead, capacity numbers and targets may be the least important indicator of how smoothly China's transition to low carbon energy takes place. Instead, China can do more to clarify how its various energy-related agencies, targets, and policies will work together to create a more efficient power system and speed up its clean energy transition.

Anders Hove is associate director for China research at the Paulson Institute.

Lydia McMullen-Laird is a freelance environmental journalist and producer for chinadialogue.

中国：煤价上涨并不意味着煤炭消费反弹

中国近期稳定煤炭价格的政策不会影响其长期的低碳经济策略，智库报告指出。

□ 莉迪亚·麦克马伦-莱尔德

中国煤炭价格上涨虽然出乎意料，但随着低碳经济的政策推进煤炭消费将会下降

六月份以来中国煤价的反弹势头令一部分人怀疑煤炭消费是否在回温。专家们也在争论这是否表示中国无法兑现气候承诺，甚至在破坏国际社会温室气体减排的努力。

绿色和平组织东亚分部的能源项目主任柳力（Lauri Myllyvirta）认为，中国早前的产量限制松动不过是稳定煤价的一种手段，与去年相比 中国的煤炭开采量仍然在显著减少。中国的煤炭产量在 2013 年达到包括国际能源机构在内的国际社会广泛认定的煤炭峰值，此后进一步下降。

新的研究

中国煤科院战略规划研究院发布的一份新报告指出，引起最近煤价上涨的因素并非消费增加，而是国内供应减少，而这是煤炭去产能造成的。该报告作者吴立新说：“最

近价格上涨的原因是政府干预造成的供应不足，而非需求增加。”

政策因素导致煤炭供应减少超过 2 亿吨，这迫使煤炭企业将年工作日数从 330 天减少到 276 天，产量减少了 10% 以上。2016 年前三个季度，中国煤炭产量与消费量差距达到 2.22 亿吨。

7 月以来席卷全国的高温造成国内电力消费的增加，进一步提高了煤价，大范围暴雨和有关部门严查车辆超载等因素也限制了煤炭的运输。

为了稳定煤价，中国政府正在采取措施恢复部分已经关停的煤炭供应。但柳力说，“尽管如此，2016 的煤炭产量仍然明显低于去年，并且远低于 2013 的峰值水平。一旦煤价回落，政策就将自动重启减产。”

需求减少

中国煤炭消费的稳步下降已持续数年，但此轮煤价暴涨引发了煤炭消费将再次超过 2013 年峰值的猜测。

吴立新的研究表明，尽管出现了煤价上涨，但热电、钢铁和建材行业的煤炭需求都在逐步减少，而这几个部门占据了中国 2015 年煤炭消费的近八成。

从长期来看，这些产业的煤炭需求将继续下降。中国已经收紧了对热电产业的管理，该部门占全国煤炭消费的一半左右。粗钢产能在未来五年将被砍去 12% 到 19%，这也将减少对煤炭的需求。建材产业的煤炭需求已经达到峰值，并将逐渐减少。

影响进口

尽管煤价高涨让中国煤炭进口量在连续三年下降后首次上升，但吴立新说这只是暂时的：“长远来看，中国的煤炭需求将稳定在 40 亿吨左右，国内供应完全可以满足。”

进口煤炭由大型油轮运到中国的沿海港口再进行分配。由于中国内河航道狭窄，油轮无法通过，只能将煤炭转移到较小的船舶上，这就增加了运输成本。随着中国加强对东南部和沿海地区煤炭消费总量的限制政策，煤炭消费向西转移，市场格局决定了煤炭进口将发生萎缩。

中国还引入了好几项措施来控制商业煤中的硫和重金属含量。这些措施扩展到进口煤炭的报关环节，增加了出口国的经营风险。此外，从 2014 年开始实施的新关税率和人民币贬值也削弱了进口煤炭的价格优势。

去碳化仍将继续

去产能政策的暂时松动决不会阻碍中国的去碳化趋势。2020 年的清洁能源目标和可再生能源增效等规划都表明中国仍然在朝着去碳化与实现气候目标的方向努力。

尽管今年始料未及的煤价暴涨造成了煤炭政策的松动，但煤炭供应和进口的增加应该只是煤炭消费减少大趋势下的一个短期波动。

莉迪亚 · 麦克马伦–莱尔德，环境记者，中外对话北京办公室图文制作人

Coal consumption not rebounding

Recent measures by China to stabilise the coal price will not affect the country's long-term decarbonisation trajectory, says think-tank report

□ Lydia McMullen-Laird

The rebound in China's coal prices since June has left some wondering whether the country's coal consumption is increasing, and prompted a debate among experts about whether China is backpedaling on its climate commitments and undermining global efforts to reduce greenhouse gas emissions.

Lauri Myllyvirta, a China energy specialist at Greenpeace East Asia, claims that China is still mining considerably less coal compared with last year despite loosening some of its earlier restrictions on production as a way to stabilise coal prices. This is furthering the decline in China's coal output, which many, including the International Energy Agency, believe peaked in 2013.

New study

A recent study by the Coal Strategic Planning Research Institute, a Chinese think tank, finds that the recent price surge is not the result of an increase in consumption and is instead driven by shrinking domestic supply resulting from efforts to cut overcapacity in the coal industry. "A supply gap created by government intervention, rather than an increase in demand, is the reason for the recent price increase," said Wu Lixin, the study's author.

The policies have eliminated more than 200 million tonnes of supply and forced coal companies to cut annual work days from 330 to 276. As a result, coal output has dropped by over 10%, creating a 222 million tonne gap between production and consumption in the first three quarters of 2016.

High temperatures across China since July caused a spike in domestic power consumption (because of cooling demand), which further contributed to the price increase, while transportation issues caused by heavy rainfall and strict rules on road overloading limited coal transportation.

In order to stabilise coal prices, the Chinese government is taking measures to bring some supply back online. But according to Lauri Myllyvirta, "This loosening will still leave 2016 output far below last year's level and well below the peak in 2013. And once prices fall, the policy will automatically scale output down again."

Decreasing demand

China's coal consumption has been steadily declining in the past few years, but the price hike has created speculation that coal consumption could rise above its peak in 2013.

Wu's study shows that despite the boom, coal demand

"A supply gap created by government intervention, rather than an increase in demand, is the reason for the recent price increase."

in the thermal power, steel and construction materials sectors, which accounted for nearly 80% of China's coal consumption in 2015, is gradually decreasing.

And in the long run, demand in these sectors will continue to fall. China has tightened regulation in the thermal power sector, which accounts for around half of its coal consumption. Crude steel capacity will be cut by 12% to 19% in the next five years, which will lead to a decline in coal demand. And in the construction materials sector, demand for coal has already begun to peak and will gradually decline.

Effect on imports

Although the price surge caused coal imports to rise for the first time this year after three consecutive years of decline, Wu says the increase is temporary: "In the long term, China's coal demand will stabilise at around four billion tonnes, which can be fully met by domestic supply."

Imported coal is transported to China's coastal ports by large oil tankers before distribution. Because China's inland shipping lanes are too narrow for the tankers to pass through, coal is transferred onto smaller vessels, which adds to costs. As the policy on capping total coal consumption in southeastern and coastal areas strengthens and coal consumption shifts west, the market for imported coal will shrink.

China has also introduced several measures to control sulphur and heavy metal content in commercial coal. These measures extend to customs clearance for imported coal and increase the operational risk for exporting countries. Furthermore, tariff rates implemented in 2014 and RMB devaluation have weakened the price advantage of imported coal.

Decarbonisation still on track

The temporary loosening of regulation around coal production by no means negates the trend towards decarbonisation in China. Clean energy targets for 2020 and plans to increase the efficiency of renewable energy show that China is still moving to decarbonise and meet its climate targets.

Although the dramatic price surge for coal was unexpected and has caused some revision of coal policies this year, the increase in supply and imports that resulted is likely only a short-term fluctuation within a broader trend of decreased coal consumption.

Lydia McMullen-Laird is a freelance environmental journalist and producer for chinadialogue.

中国成为全球最大的发展融资提供者

新报告称，中国作为多边贷款方的地位愈发突出，其中存在着重大风险。

□ 罗伯特·苏塔

新研究指出，虽然目前两大中国银行发放的国际发展融资额位列全球前两位，其提供的资金总量约等于排名第3到第8位的多边贷款机构的总和，但它们正在面临严峻的政治、社会和环境风险

波士顿大学全球经济治理倡议和中国社会科学院共同开展的一项研究显示，中国将全球可用于发展项目的资本基数几乎提高了一倍，让那些鲜少有机会获得国际融资的发展中国家得以弥补基础设施建设缺口和能源短缺。

报告认为："这样的稳步增加来得正是时候。"，并且指出西方的多边开发银行（MDBs）在扩大投资组合方面的工作似乎陷入了停滞。

2007至2014年年底，中国国家开发银行和中国进出口银行（CHEXIM）总共发放贷款约6840亿美元，融资数额排名在第3到第8位的机构（包括世界银行、日本的亚洲开发银行以及泛美开发银行）总共发放的贷款数额则为7000亿美元。与此同时，中国的政策性银行将面向各国政府的能源相关融资数额提高了1170亿美元，总额翻了一番。

国家开发银行主导了大量的海外发展借贷

然而，尽管这些数字看起来十分可观，中国的贷款资产组合仍面临着相当大的风险。因为中国能源相关融资中约有66%集中在火力发电行业，这些贷款的外部效应才是真正的问题。

"我们采取保守方式估计燃煤电厂碳排放的健康成本和气候成本，计算得出中国在海外投资建设的火力发电厂每年约造成297亿美元的社会成本(人口增加带来的健康成本加上社会冲突相关的成本)。"报告作者说。

此外，由于市场价格的波动，这些国家偿还债务（通常以煤炭、石油等商品形式）的能力也受到了威胁。

报告认为，为了抑制排放、降低风险，中国应推动投资组合多样化，发展更为清洁的能源项目，从而帮助确保中国的海外投资与国际可持续发展目标保持一致。

风险

经济低迷影响了借款国的债务偿还能力。中国在向这些很难从其他渠道获得资金的借款方提供融资时，也将直面其经济衰退带来的无法还贷的风险。

近来，早已焦头烂额的委内瑞拉总统尼古拉斯·马杜罗宣布国家进入60天的紧急状态。该国目前已拖欠中国债款高达650亿美元，该国政府近日宣布已与中国经过磋商，达成了更好的还款条件，并称这一举措让委内瑞拉这个被全球油价崩溃扼住喉咙的石油经济体“呼吸到了氧气”。

经济合作与发展组织（OECD）认为，还有一些接受大量中国能源项目融资的国家同样存在高风险。埃塞俄比亚、尼日尔、苏丹、巴基斯坦以及波黑等国都和委内瑞拉一样，是风险最大的投资目的地。

阿根廷也是其中一员，但鉴于总统毛里西奥·马克里上台后支持发展市场，其他机构都下调了对该国的风险评级。

厄瓜多尔的风险仅稍低于上述各国。2008年，该国发生主权债务违约，此后陆续向中国的银行借贷80亿美元用于能源项目的开发。

除了债务无法偿还的风险，化石能源项目碳排放增加还会导致气候变化加剧，其后果几乎是不可估量的。研究估计，包括中国海外投资组合在内的火力发电厂每年约排放5.94亿吨的二氧化碳，分别相当于美国和中国年排放总量的11%和6%。

与此同时，中国国家统计局数据显示，中国国内煤炭消耗已经连续两年出现下滑，可见中国对海外煤炭市场的投资与国内政策的脱节已经越来越严重。

专家预测，为了履行《巴黎协定》中降低二氧化碳排放的承诺，中国今年将会把原本就供过于求的煤炭供应量减少约10亿吨。

环保活动者近日告诉中外对话，这种控制国内煤炭生产却在国外大肆投资煤炭行业的行为很“虚伪”。

可再生能源

中国可再生能源投资占能源投资总额的28%，而多边开发银行的这一数字平均为88%。并且，中国的可再生能源投资中还包括水电工程这类会对环境造成重大影响的能源开发项目。

中国非水电可再生能源的发展资金在投资总额中的占比还不到1%，而多边开发银行的这一数字为27%。

由于煤炭和水电投资的比例很高，对中国各大政策性银行和13项新的区域发展基金而言，将投资目标转向更为清洁的技术将会是一大挑战。

尽管如此，中国银行在国际发展融资领域及新兴多边开发银行中的地位日益凸显，这些都说明其在引领全球低碳经济转型方面拥有“得天独厚的优势”。

“中国的融资非常受欢迎，而且来得太是时候了。”报告称。

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罗伯特·苏塔，中拉对话执行编辑，常驻英国伦敦

China, world's biggest development lender

China's increasing weight as a multilateral lender carries major risks, says new report

□ Robert Soutar

Two Chinese banks now provide as much international development finance as the next six biggest multilateral lenders combined – but are greatly exposed to political, social and environmental risks, new research says.

In almost doubling the global capital base available for development projects, China has enabled developing countries with less to access international finance to bridge gaping infrastructure and energy shortfalls, according to a study by Boston University's Global Economic Governance Initiative and the Chinese Academy of Social Sciences.

"Such a stepwise increase arrives just in time," the paper says, pointing out that Western multilateral Development Banks (MDBs) appear to be stagnating in expanding their portfolios.

China Development Bank and the Export-Import Bank of China (CHEXIM) together lent some US$684 billion between 2007 and the end of 2014. The next six biggest lenders, which include the World Bank, the Japan-led Asian Development Bank and the Inter-American Development Bank, have provided finance worth US$700 billion. During the same period, China's policy banks increased energy-related finance to national governments by US$117 billion, representing a two-fold increase in the total amount.

Yet despite the impressive figures, China's loan portfolio is subject to considerable risks. With 66% of energy-related finance concentrated in coal-fired power, the associated costs of these loans, known as externalities or social costs, are a real concern.

"Using conservative estimates of the climate and local health costs of coal plant emissions, we calculate that the yearly social costs [the health costs of increased pollution plus the costs associated with social conflicts] of Chinese overseas coal-fired power plants amounts to US$29.7 billion," the report's authors say.

Furthermore, the ability of countries to service their debt to China – which is often repaid with commodities such as coal and oil – is threatened by fluctuating market prices.

In order to curb emissions and reduce risk, China should diversify its investment portfolio towards cleaner energy projects, the report says. Doing so would also help bring China's overseas investments in line with international sustainable development goals.

Risks

While China has lent to borrowers who face difficulty accessing finance from elsewhere, this has drastically increased its exposure to economic downturns in recipient countries, which impacts their ability to repay loans.

Venezuela, whose troubled president Nicolás Maduro recently announced a 60-day state of emergency, is currently in debt to China to the tune of US$65 billion. The Venezuelan government recently announced it had negotiated better repayment terms with China, saying the move "gave oxygen" to an oil-dependent economy asphyxiated by the crash in global prices.

A number of other countries to which China has lent significantly for energy projects are considered high risk by the Organization of Economic Co-operation and Development (OECD). Ethiopia, Niger, Sudan, Pakistan

and Bosnia & Herzegovina all rank alongside Venezuela as the most risky destinations for China's energy investments.

Argentina also features in this group but the election of pro-market president Mauricio Macri has led to a downgrading of the country's risk rating by other agencies.

Only marginally less risky is Ecuador, which defaulted on its sovereign debt in 2008 and has since borrowed upwards of US$8 billion from Chinese banks for energy projects.

In addition to the risk of non-repayment, the consequences of exacerbating climate change by increasing carbon emissions are almost inestimable. The study estimates that the coal-fired power plants included in China's overseas investment portfolio emit 594 million metric tonnes of CO2 annually, equivalent to 11% of US total annual emissions and 6% of China's.

Furthermore, China's financing of coal overseas is increasingly out of step with its domestic policies as domestic consumption has fallen for two consecutive years, according to China's National Bureau of Statistics.

Experts predict China will reduce its current over-supply of coal by around one billion tonnes this year as it attempts to bring CO2 emissions in line with commitments made under the Paris Agreement.

Environmental campaigners recently told chinadialogue that curbing coal at home whilst promoting it abroad was "hypocritical".

Renewables

China devotes 28% of its total energy finance to renewable energy, whereas the MDB's allocate an average 88%. However, these figures include hydropower projects, which have major environmental consequences.

Scarcely 1% of China's development finance goes to non-hydro renewables. The MDBs invest 27%.

Given the high proportion of investments in coal and hydropower, shifting investments to cleaner technologies represents a big challenge for China's big policy banks and 13 new regional development funds.

Nonetheless, China's emergence as major player in international development finance and within new multilateral development banks means it is "uniquely placed" to steer the transition to a low-carbon economy.

"This finance is very welcome and could not come at a better time," the report says.

Robert Soutar is Managing Editor of Diálogo Chino, based in London.

中国化工收购瑞士先正达：缘何重要

中国对转基因食品的逐渐接受，全球粮食安全和主权恐受到威胁。

□ 艾德里安·伊利

本周，美国国家安全小组通过了中国国有企业中国化工集团收购瑞士种子及生物技术农业综合企业先正达的交易计划。此次交易资金为430亿美元，是迄今为止中国公司规模最大的一项海外收购案。它与群象擦肩而过是一件非常震撼的事情，而且还是在夜间的塞拉和莫拉克民间保护区，这简直就是美梦成真。这也说明，混合多种土地性质，依托社区的生态保护策略或许才是如今非洲野生大象保护难题的正确解决方案。

该交易还需要获得欧洲及美国反垄断当局的批准。而美国外国投资委员会（CFIUS）已经宣布，此次收购案很可能在今年年底之前获批。美国外国投资委员会由美国财务部长主持，成员包括农业部在内的美国16个部门和机构的代表。

长期以来，环保主义者一直都谴责全球粮食系统的权力过于集中。而此次交易以及其他即将进行或正在酝酿之中的并购案，很可能会使全球种子市场超过75%的份额掌握在仅3家企业手中。难怪政客们和民间社会团体纷纷表示担忧，唯恐将来会发生进一步合并。

先正达超过四分之一的营业额来自美国。爱荷华州共和党参议员查克·格拉斯利对这一交易造成的影响表示担忧。他解释道，食品和农业部门是国家关键基础设施的一部分。“对于种子行业内部继续合并造成的长期影响，我还是很困扰的。农场主购买种子时可以选择的公司变少了，这对他们又意味着什么，”格拉斯利告诉WNAX电台。

美国两大组织，全国农场主联盟以及食品和水观察组织也以国家安全风险、关键技术转让以及对农场主和消费者造成的负面影响为由，敦促美国外国投资委员会否决这笔交易。

他们在信中表示，该交易“将加速全球粮食和农业综合企业的合并，进而对美国农场主、农业社区以及消费者造成损害”，并认为此次交易会将关键专利技术（不仅是种子方面，同时也有高科技农化技术）转让给中国企业。信中还提到了“中国化工企业的安全意识较为薄弱”的问题。

中国化工集团此次收购计划似乎表明，中长期时间内，中国政府可能会接受转基因食品的生产。中国转基因（GM）作物的发展有赖于国家数十年来在研发方面的巨额投资，以及政府近来对新兴农业生物技术公司的支持。

中国化工集团总经理任建新以其强大的政府关系背景著称，曾主持收购国内外多家公司。他表示，文化大革命期间自己在农村的生活经历告诉他：农民想要的是什么以及他们怎么在土地上劳作”。

“中长期时间内，中国政府可能会接受转基因食品的生产。中国转基因（GM）作物的发展有赖于国家数十年来在研发方面的巨额投资，以及政府近来对新兴农业生物技术公司的支持。”

如果“农民想要的”是转基因种子，那他和中国政府似乎英雄所见略同了。“十三五规划”中首次承诺将在2016至2020年间积极推广转基因作物，同时也强调了严格监管的重要性。

但与此同时，中国在批准转基因食品生产方面的犹豫也说明，通往商业化种植的道路依旧崎岖。中国部分中产阶级越来越多地关注更加“自然”的有机食品，而近来的食品恐慌更是打击了公众对食品安全的信心。

绿色和平组织的一位发言人将2014年中国政府迟迟不愿续发转基因大米许可证一事与“公众对安全问题的担忧”联系到了一起。而今年早些时候辽宁省种植非法转基因玉米（也是由绿色和平组织报道的），也进一步说明了有效规范这一技术的困难之处。

在中国，前化工行业部部长以及反转基因活动者共同签署了一封公开信，其中指出了农业化学品对中国农民以及消费者造成的负面影响，并呼吁此次收购案应向中国全国人民代表大会代表、政治协商委员会委员、以及各民主党派和消费者代表开放。

因此，辩论可能才刚刚开始。

笔者关于中国农业生物技术规范的研究工作显示，多年来，海外跨国公司一直试图在中国商业化推广其专有技术，这也使得北京方面深深感受到了对食品安全及主权的担忧。而当前这一事件表明，华盛顿方面也对食品链的控制表现出了担心。各方对这一问题的日益关注，体现了此次交易不仅对中美两国的农业，而且对全球粮食系统的未来走向都有着重要意义。

艾德里安·伊利，英国萨塞克斯大学科学政策研究部高级讲师

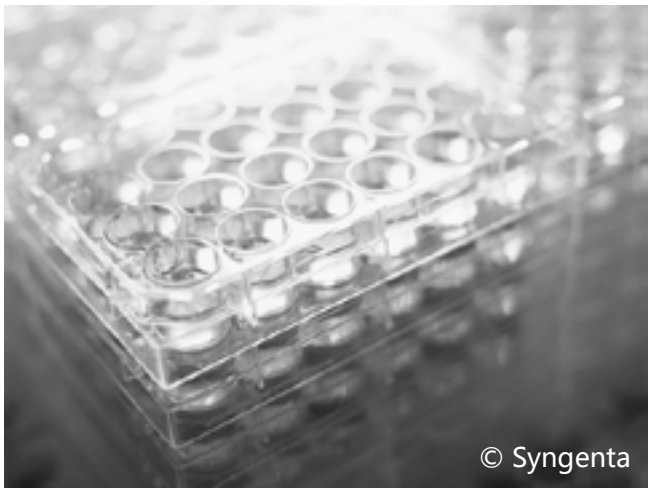
Chem China-Syngenta deal

Global food security and sovereignty could be threatened as China moves closer to embracing GM food, writes Adrian Ely

□ Adrian Ely

A US national security panel this week cleared a deal proposed by state-owned Chinese company ChemChina to acquire Syngenta, the Switzerland-based seed and biotechnology agribusiness. At US$43 billion (287 billion yuan), it will be the largest foreign acquisition ever by a Chinese firm.

The deal also requires approval by antitrust authorities in Europe and the United States, but having cleared the Committee on Foreign Investment in the United States (CFIUS), chaired by the US Secretary of the Treasury and attended by representatives of 16 US departments and agencies, including the Department of Agriculture, it is likely to be given the go-ahead by the end of the year.



The deal will transfer critical patented technologies in seeds and high-tech agrichemicals into Chinese ownership

Environmentalists have long decried the concentration of power in the global food system. This deal, along with other pending and possible acquisitions, may leave just three companies with more than 75% of the global market in seeds. So it is little wonder that politicians and civil society groups have reacted with concern at the prospect of further consolidation.

In the United States – which accounts for more than one quarter of Syngenta's sales – Republican Iowa senator Chuck Grassley raised concerns about the effect of the deal, explaining that the food and agricultural sectors are part of the nation's critical infrastructure. "I remain troubled about the long-term effects of continued consolidation in the seed industry and what that will mean for farmers who have fewer companies to buy seed from," he told WNAX radio.

Two US organisations – the National Farmers Union and Food and Water Watch – had also urged CFIUS to reject the deal, citing national security risks, the transfer of critical technologies and negative impacts on farmers and consumers.

Their letter argued that the deal "accelerates the international consolidation of the food and agribusiness industries to the detriment of American farmers, rural communities, and consumers," and suggested it would transfer critical patented technologies (not only in seeds, but also high-tech agrichemicals) into Chinese ownership, as well as "the weaker safety and security culture of Chinese chemical companies".

The move by ChemChina seems to suggest that in the medium to long-term, the Chinese government is likely

to embrace the production of genetically modified (GM) food. China's approach to genetically modified crops builds on decades of huge state investment in research and development and its more recent support of emerging agri-biotech firms.

The company's chairman Ren Jianxin, who is known for his strong government links and his reputation for acquiring both domestic and foreign firms, claims that his experience of living in the countryside during the Cultural Revolution taught him "what farmers want and how they work the land".

If "what farmers want" is genetically modified seeds, it seems that Beijing agrees with him. The 13th Five Year Plan for the first time promised to actively promote GM crops in the period from 2016 to 2020, while also stressing the need for stringent oversight.

Yet at the same time, the hesitation to approve genetically modified food production suggests the road to commercialisation is a rocky one. Sections of China's middle class are increasingly looking towards more "natural" organically produced food, and recent food scares have not helped to boost public confidence.

A spokesperson from Greenpeace linked the delayed re-approval of permits for GM rice in 2014 to "public concern around safety issues", and the identification of illegal GM maize in Liaoning earlier this year (again reported by Greenpeace) has further illustrated how difficult it is to effectively regulate the technology.

In China, an open letter, apparently signed by the former minister for the chemical industry as well as anti-GMO activists, pointed to negative impacts of agri-chemicals on Chinese farmers and consumers and called for the case to be opened to China's National People's Congress representatives, committee members of the Chinese People's Political Consultative Conference, representatives of the democratic parties and consumers.

The debate, therefore, may have only begun.

Our work on agricultural biotechnology regulation in China has indicated that concerns over food security and sovereignty have been felt keenly in Beijing for many years, as foreign multinationals have sought to commercialise their proprietary technologies across the country. This current episode indicates that concerns over control of the food chain are felt in Washington as well. Rising concerns illustrate the significance of the deal not only to agriculture in the US and China, but also to the future shape of the global food system.

Adrian Ely is Senior Lecturer at the Science Policy Research Unit at the University of Sussex.

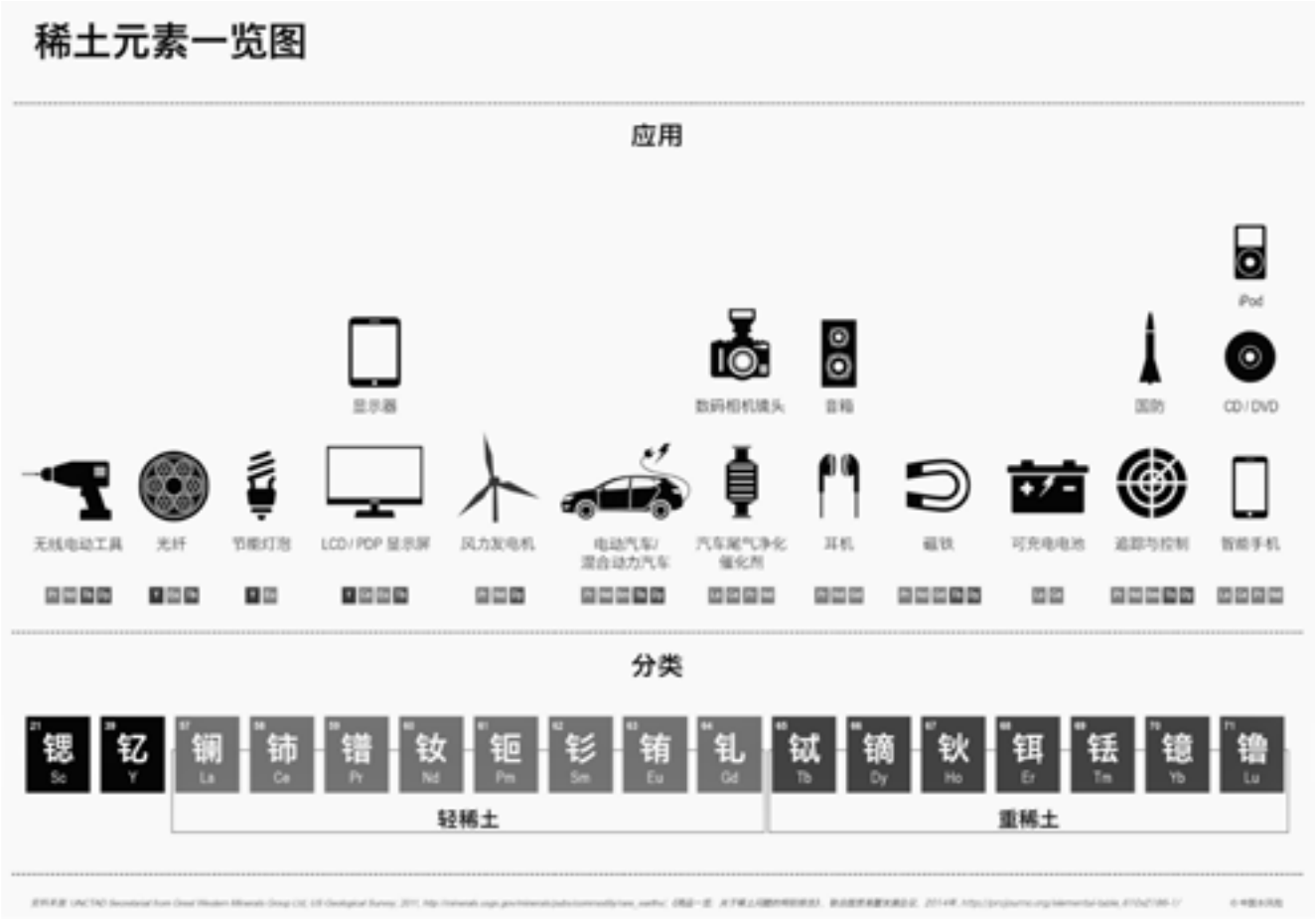
从赣州到巴黎：稀土是否会成为低碳未来的软肋？

稀土原材料供应短缺或制约野心勃勃的全球清洁能源和智能科技发展目标，风险早已超越环保压力。

□ 刘虹桥

2012年，当中国中部江西省的赣州市被政府正式命名为“稀土王国”时，它的稀土资源储量其实已所剩无几。据中国国务院新闻办公室同年发布的“稀土白皮书”，以赣州市为代表的“南方离子型稀土矿”（ion-absorption rare earth）的储采比已降至15。也就是说，如果保持当年的开采量，这种富含中重稀土(MHREE)的矿产资源只能再开采15年左右。

三年后，在距离赣州市一万多公里的法国巴黎，全球190多个国家达成了划时代的《巴黎气候协定》。当人们欢呼庆祝全球走上“去碳化”道路时，可能并没有人注意到，中国



中南部的这个小城的命运对于实现这一目标有着怎样的影响。事实上，象征着清洁、智能、低碳未来的科技产品几乎无一能离开稀土。

问题是，是否有足够的稀土资源来满足我们所畅想的清洁和智能未来？在过去 20 年间供应了全球 90% 以上的稀土资源的中国，又能否继续支撑未来预期需求增长？

“稀土王国”的暗面

五十多年前，中国地质学家在赣州发现了随后改写了全球中重稀土供应格局的“离子吸附性稀土矿”。随着中国取代美国成为全球最大的稀土生产国，赣州迅速成为全球最大的中重稀土产区。

如今，赣州资源急剧衰竭，但赣州市的中重稀土开采量仍占中国半壁江山。

实地造访赣州市的稀土矿区和工业园区，却无法感受到“稀土王国”之名承载的荣耀与尊贵。满目苍夷的矿区、简陋的露天矿区和冶炼池，以及泥泞粗犷的矿山修复工程，很难与这些矿产的终端应用产品联系在一起。

矿区内外的水污染严重。据《中国环境报》，2012 年，仅在龙南县，就有 3 万多人的生活用水受到稀土开采影响，4 万余亩农田减产或绝收。历经十余年的疯狂开采，中国最大的离子型稀土矿足洞矿区周边地表水环境中的氨氮和总氮严重超标；矿区地下水远不能满足饮用水水源的最低标准。

2012 年 4 月，由工信部牵头的多部委调查小组在实地考察后称，赣州市废弃稀土矿区达 302 个，毁坏

赣州足洞矿区一家被遗弃的稀土粗矿提炼车间

雨季，浸矿池和矿山上残留的化学品顺着地势流向矿区内的大小河流

在赣州，稀土矿为露天开采，图为赣州某矿区的露天浸矿池

土地面积达 97.34 平方公里；仅处理残留的 1.9 亿吨废渣，就需要 70 年。

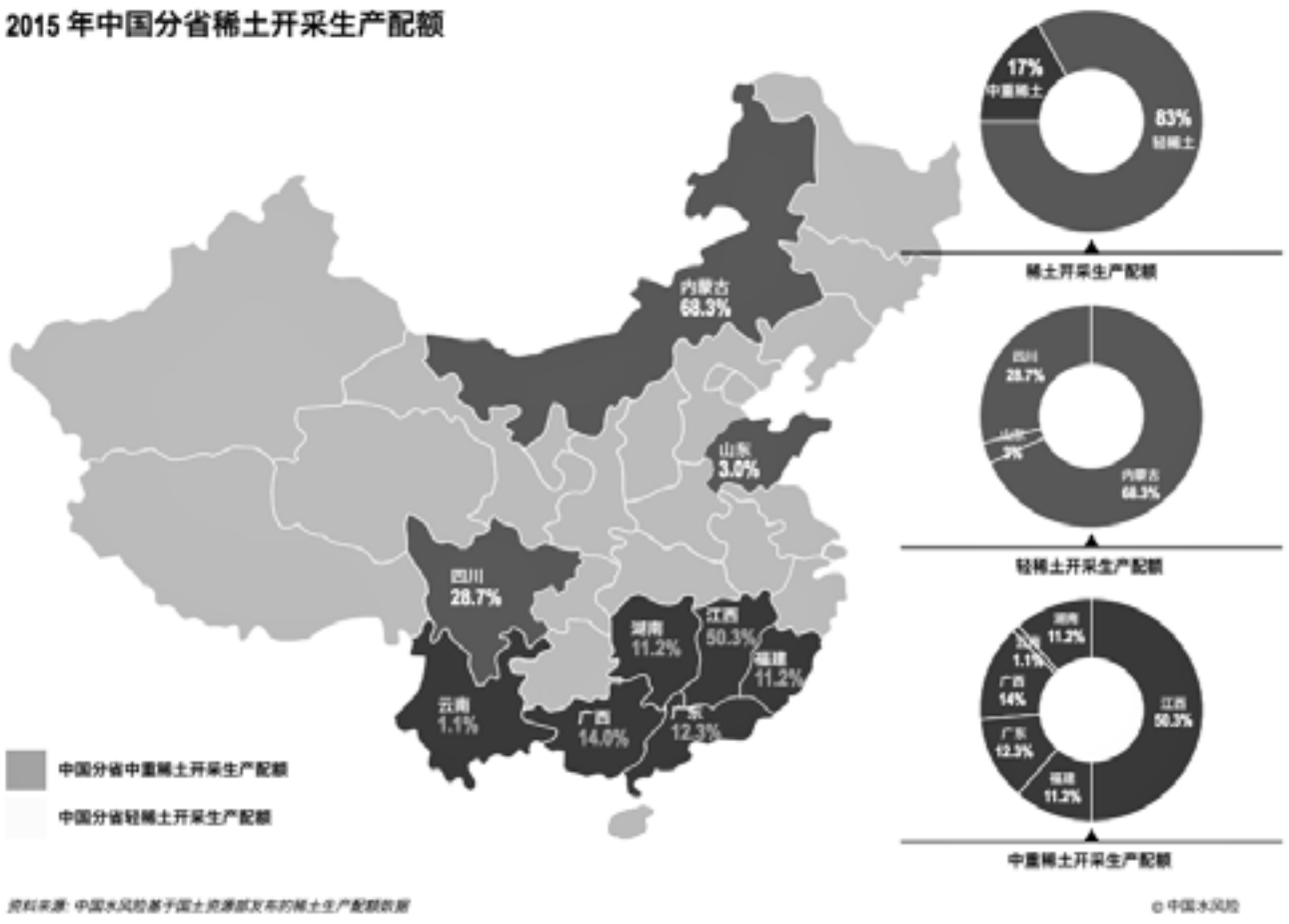
“中国时代”的背面

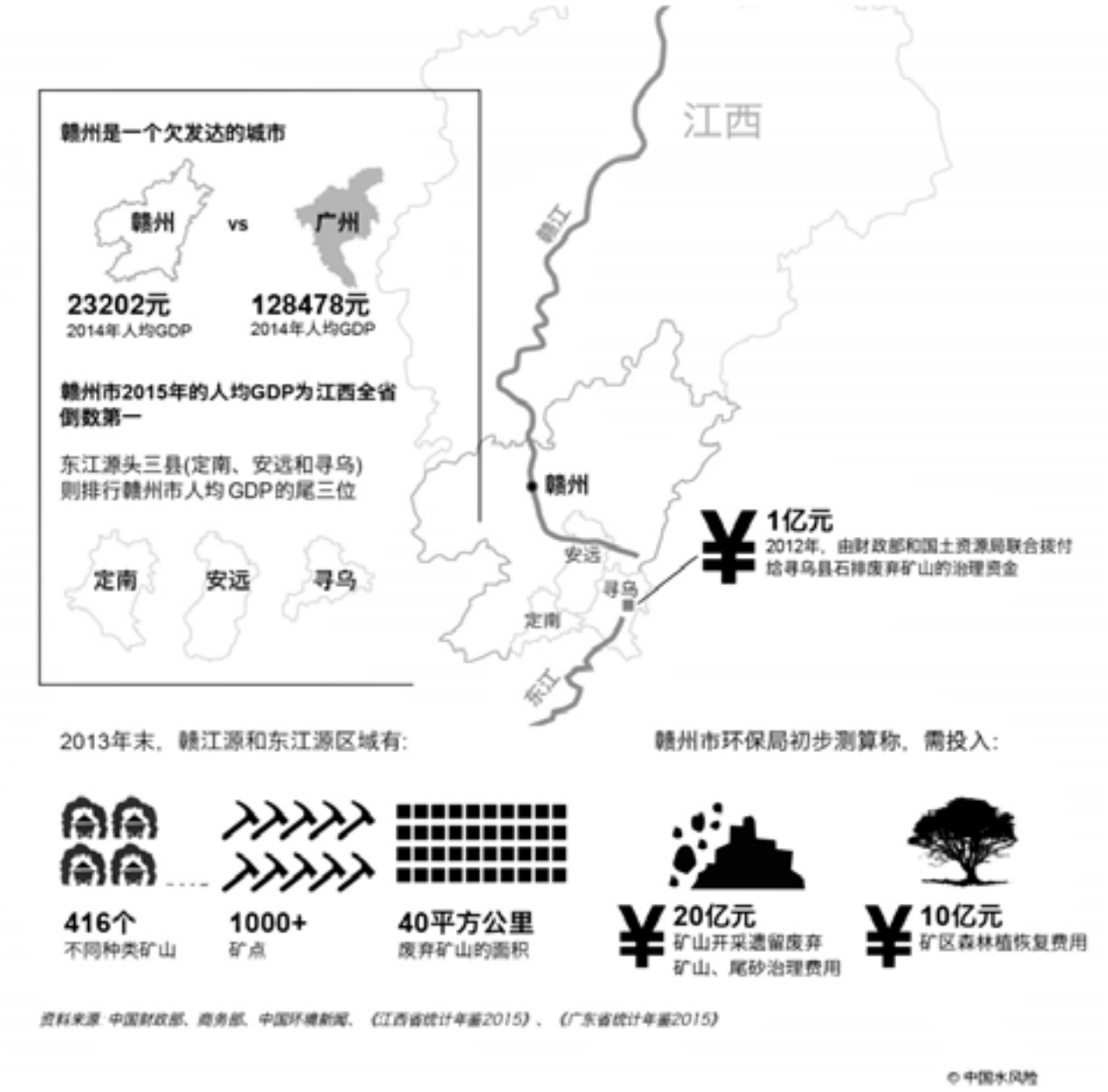
中国政府声称该国“以不足全球 23% 的稀土资源储量供应了全球 90% 以上的稀土需求”。中国在 20 世纪 90 年代初取代美国成为全球最大的稀土生产国和出口国，此后几乎成为全球稀土市场上独当一面的资源供应国，部分稀土产品甚至只在中国生产。若追根溯源，绝大多数的荧光灯、离岸风机、电动汽车 / 混合动力汽车、智能手机和个人电子设备，都因产品中使用的稀土成分而携带着“中国基因”。据美国地质调查局，中国稀土占全球产量的比重一度高达 98%。2015 年，这一比重仍高达 85%。

表面上，中国稀土占据全球稀土市场的主导地位，但在“风光”的背后，还有很多事实未被充分揭露。无论是从中国进口稀土的主要受益国，如欧美日韩，还是使用稀土原材料的制造商和品牌，似乎都选择性地忽视了规模可观的稀土黑市。每年，成千上万吨稀土被非法开采、交易，并经由跨国黑市流出中国。处于供应链下游的品牌对此充耳不闻，国际间的执法合作也十分有限。由于缺乏国际流通商品追溯体系，企业也没有像对待“冲突矿产”（conflict minerals）那样，将稀土纳入供应链管理，我们很难识别出自己驾驶的电动汽车或正在使用的智能手机，是否含有非法开采、走私的稀土。

在巨额利润的驱动下，赣州市非法开采活动屡禁不绝。中国稀土行业协会估计：2013 年，中国南方稀土矿的实际供应量为 5 万吨以上；2014 年在 4 万吨以上。 而同期国土部下达的合法生产配额只有 1.79 万吨。这意味着，非法市场的规模可能已达到合法市场的 2.2 到 2.8 倍。

无论是合法还是非法开采，稀土开采的环境代价都很惊人。当我们将清洁能源驱动的稀土需求量的增长与其环境影响匹配时，就会发现，这些清洁、低碳、智能产品里





的“中国基因“决定了它们可能名不副实。据文献报告，每生产一吨稀土矿（以稀土氧化物计）要产生 200 立方米的酸性废水。即便不考虑冶炼、分离、加工、运输等其它生命周期中的排放问题，为生产 2050 年所有中国风机中的稀土原材料（风电激进增长情景下），理论上就要产生 8000 万立方米废水，这相当于 8 个杭州西湖的库容量。

商界领袖、决策者和消费者都需要重新思考：我们应采取怎样的行动，才能以对环境和气候更友好的方式实现我们的低碳发展目标？毕竟，牺牲资源原产地的环境和民众健康为代价，换取低碳发展，不仅自相矛盾，更有违正义。

“后巴黎协定”时代的新挑战

今年 4 月，170 多个国家在纽约签署《巴黎协定》，“去碳化”已成定局。是时候在新世界格局下重新审视中国稀土及其息息相关的清洁、低碳、智能科技的关系了。

历经 20 余年以资源环境为代价的“中国时代”，中国的稀土资源已大幅衰竭，市场定价机制常年失灵使得数以百亿计的环境成本未被有效定价，猖狂的国际和国内稀土黑市进一

步加剧了资源流失和环境污染。这导致的后果是，中国政府不得不承担巨额的环境修复费用，而稀土矿区附近的居民直接或间接地承受了稀土开发带来的环境和健康损害。

另一方面，中国已不再是单纯的稀土资源供应国和出口国，中国国内市场对稀土资源的需求量已显著增长。中国是全球风电投资的最主要驱动者。在国家发改委能源研究所设计的最激进的增长情景下，中国风电装机容量可能在2050年前达到20亿千瓦（2TW），而一台典型的两兆瓦（2MW）风机里含有341-363公斤的稀土钕（Nd）和59公斤左右的稀土镝（Dy）。仅是支撑风电增长消耗的稀土量就足够惊人，这还没算上“中国制造2025”计划提出的优先发展领域，如新能源汽车、海洋工程装备、航空航天设备等拉动的稀土需求增长。

中国未来可能无法满足本国需求，更别提供应全球其它国家的需求预期增长。据联合国贸易暨发展会议(UNCTAD)估计：至2020年，全球稀土需求将达20到24万吨左右，其中七成需求来自中国。即便中国满负荷使用全部开采配额，每年新增稀土产量与预期需求量之间还存在3.5至6.3万吨差额。这些稀土将从何而来？

从稀土出发，会发现我们的低碳未来还面临着许多未被解答的问题：废水如何处理？是否会造成新的饮用水安全问题？为减少排放而进行的技术和管理改良的成本，最终会否进入稀土价格？

早在2014年，中国政府就已“向污染宣战”，加之“史上最严”《环保法》和陆续出台的稀土行业水耗、能耗、排放标准，中国稀土行业的合规成本势必增长——在中国低价开采和加工稀土已成过去。来自欧盟和美国的研究机构都指出，轻稀土将在中短期内面临供应短缺，中重稀土则将在中长期内持续面临供应短缺。无论是从哪个方面看，稀土价格都将上涨。

全球的低碳未来是否将受制于这些被称为“工业维生素”的矿物，这将是世界不得不面对的问题。

刘虹桥是一名屡获奖项的环境调查记者，常驻北京

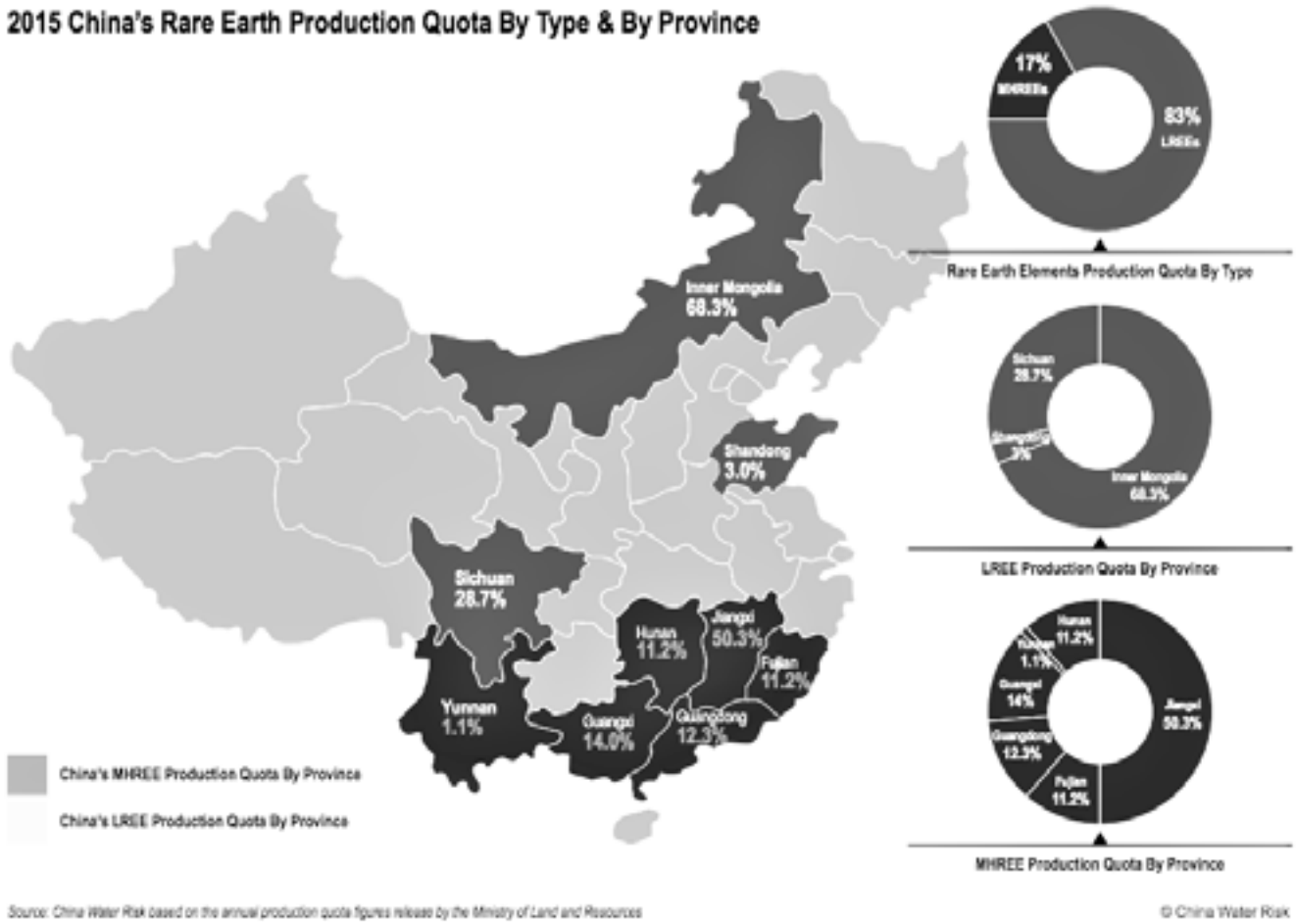
The rare earths crisis

Rare earth metals are essential for wind turbines and electric vehicles but potential short supply may become a limiting factor, writes Liu Hongqiao

□ Liu Hongqiao

Rare earth metals, hard-to-find materials, with unfamiliar names such as lanthanum, neodymium and europium, are used in wind and solar energy projects, but dwindling supplies could hinder a roll-out of low carbon technologies and slow China's shift away from coal power.

These compounds, which are highly toxic when mined and processed, also take a heavy environmental toll on soil and water, posing a conundrum for policymakers in China,



MHREE: Medium heavy rare earth metald. LREE: Light rare earth metal

the world's biggest producer and consumer of rare earths.

In 2012 the Chinese government named the city of Ganzhou, in the southeastern province of Jiangxi, a "rare earths kingdom"; even though at that time its rare earth reserves were already almost depleted.

According to a rare earths white paper issued by the State Council News Office in 2012, the reserves to extraction ratio for rare earth elements in southern China was 15. In other words, if mining continued at the existing rate, those reserves rich in medium and heavy rare earth elements (MHREEs) would only last for another 15 years.

Three years later and 6,000 miles away in Paris, 190 countries signed the historic Paris Climate Agreement, including plans to introduce a greater share of wind and solar power in a "decarbonised" future. But few of the delegates gathered in Paris seemed to realise how important one small south-central Chinese city would be to achieving this target; as almost all the clean, smart and low-carbon technologies are reliant on rare earths.

This prompts the questions: do we have enough rare earths to build the clean and smart future we're imagining; can China, supplier of 90% of the global rare earths over the last 20 years, meet expected growth in demand; and what will the environmental consequences be.

Rare earths kingdom

Chinese geologists working in Ganzhou fifty years ago discovered ion-absorbing rare earths; a discovery that restructured the world's supply of rare earths. China replaced the US as the biggest producer of rare earths and Ganzhou rapidly became the world's largest producer of MHREEs.

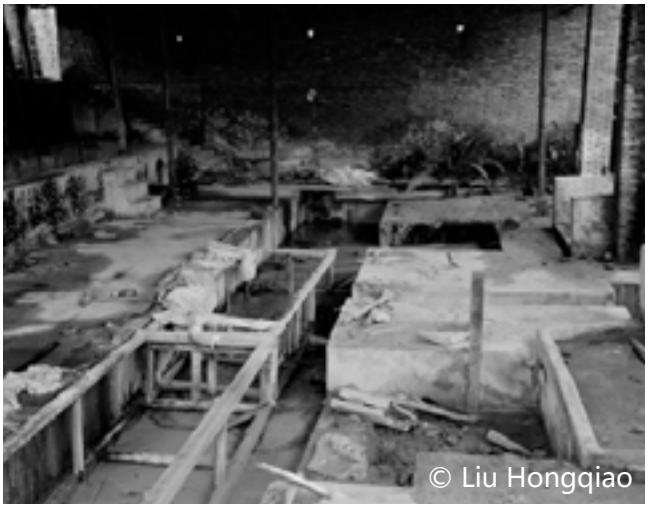
Despite rapidly depleting reserves Ganzhou still accounts for more than half of all MHREEs produced in China.

A visit to the mines and industrial parks of Ganzhou gives no sense of a glorious "kingdom". It's a scene of devastation: crude open air mines and smelters, and rough muddy attempts at restoring the landscape. It's a sight hard to associate with the environmental technologies that rare earths are used in.

Water in and around the mining area is severely polluted. According to China Environmental News, the water supply for 30,000 people in the county of Longnan alone has been affected by rare earth mining, with 40,000 mu (6,589 acres) of farmland seeing reduced yields or complete harvest failure.

A pre-treatment pool at a mine site. These pools are a requirement of China's new environment standards

A board in Ganzhou saying,"to conserve water and soil is to protect human life"



An abandoned factory in Zudong mine site in Ganzhou

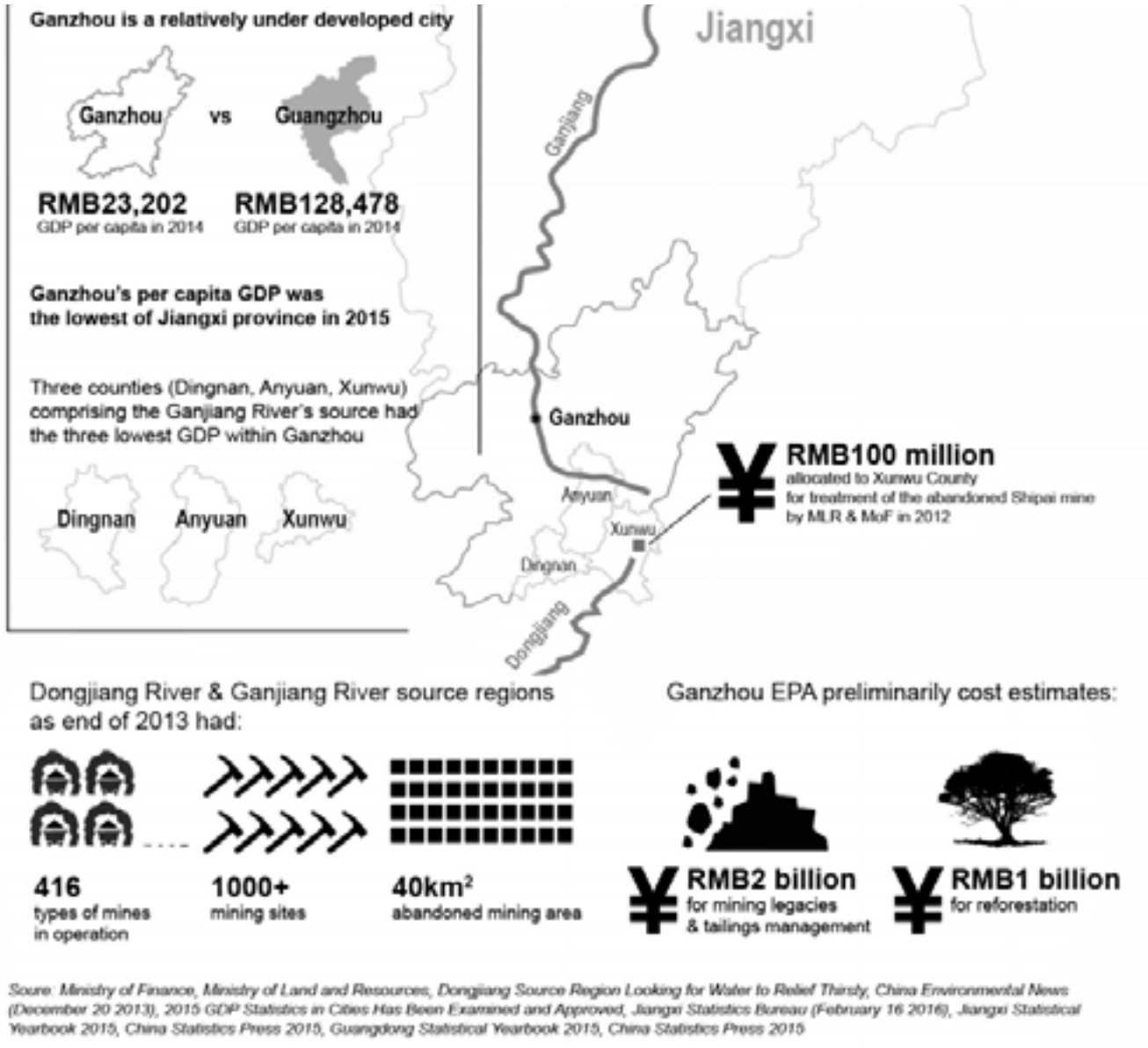
Over a decade of excessive extraction has left the surface water in the Zudong mining area, China's biggest source of ion-absorption rare earths, with ammonia and total nitrogen levels far above safe standards; while groundwater is nowhere near up to minimum drinking water standards.

In April 2012 a cross-ministry investigation headed up by the Ministry of Industry and Information Technology found 302 abandoned rare earth mining sites in Ganzhou, with 97.34 square kilometres affected. It would take 70 years just to deal with the 190 million tonnes of mining waste left behind.

Black market

China's government says the country "meets 90% of the world's demand for rare earths, but has only 23% of global reserves." In the early 1990s China overtook the US to become the world's biggest producer and exporter of rare earths and since then has virtually become a monopoly supplier, with some rare earth products produced only in China. If you trace them back to the source the vast majority of fluorescent lamps, off-shore wind turbines, electric and hybrid cars, smartphones and personal

Industrial profile of Ganzhou



Soure: Ministry of Finance, Ministry of Land and Resources, Dongjiang Source Region Looking for Water to Relief Thirsty, China Environmental News (December 20 2013), 2015 GDP Statistics in Cities Has Been Examined and Approved, Jiangxi Statistics Bureau (February 16 2016), Jiangxi Statistical Yearbook 2015, China Statistics Press 2015, Guangdong Statistical Yearbook 2015, China Statistics Press 2015

electronic devices have, thanks to the rare earths used in their components, "Chinese DNA".

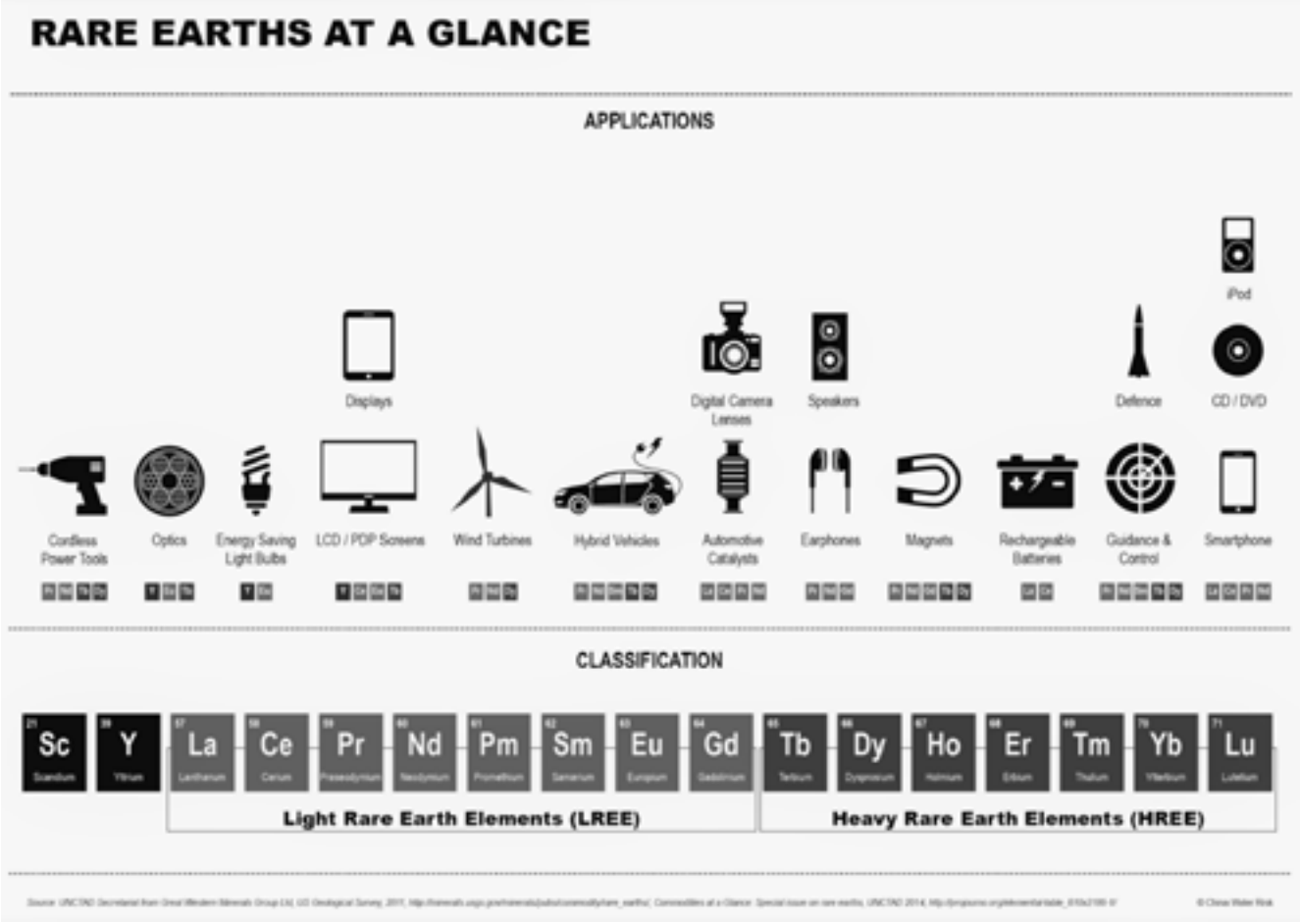
According to the US Geological Survey, at one point China was accounting for 98% of global rare earth output. In 2015 that figure still reached 85%.

China plays an even bigger role in the world's rare earth trade than is apparent on the surface because of its black market. The main importers who benefit from China's rare earths production, such as the US, Korea and Japan, as well as the manufacturers and brands who use rare earths in their products, often tap into a substantial black market in rare earths. Every year tens of thousands of tonnes of rare earth ores are illegally mined and traded, leaving China through the black market.

Those higher up the supply chain turn a blind eye to this, and international cooperation on law enforcement is minimal. With no international traceability system, such as that for conflict minerals, companies have no way of monitoring supply chains and we cannot know if the electric cars we drive or the smartphones we use contain illegally mined and smuggled rare earths.

The huge profits to be made means Ganzhou is plagued by illegal mining. The China Rare Earth Industry Association estimates that in 2013 the actual supply of rare earths in southern China was over 50,000 tonnes, and over 40,000 tonnes in 2014. However the Ministry of Land and Resources only permitted output of 17,900 tonnes per year for that period. That means the black market may be two to three times the size of the legitimate market.

And rare earth mining, whether legal or not, entails shocking environmental costs. Research has found that producing one tonne of rare earth ore (in terms of rare earth oxides) produces 200 cubic metres of acidic waste water. The production of the rare earths needed to meet China's demand for wind turbines up to 2050 (in a scenario of radical wind power expansion) will result in the release



© China Water Risk

of 80 million cubic metres of waste water – enough to fill Hangzhou's West Lake eight times over. Not to mention the emissions from the rest of the product lifecycle; smelting, separation, processing, transportation.

Business, policy-makers and consumers all need to think again: what actions can we take to ensure we meet our low-carbon goals in a way which is friendlier to both the environment and the climate? It is after all both contradictory and unjust to sacrifice public health and the environment in a resource-producing area for the sake of low-carbon development.

New challenges in a post-Paris era

In April over 170 countries visited New York to sign up to the Paris Agreement, buttressing attempts at "decarbonisation".

That means now is the time to look again at the link between China's rare earth resources and the clean, low-carbon and smart technologies relying on those.

Over the last 20 years the environment has paid the price for China's economic successes.

The country's rare earth reserves are much depleted; environmental costs in the trillions of yuan have not been factored into market prices; and a rampant black market in rare earths, both at home and abroad, has exacerbated environmental damage and the loss of resources.

This has left the Chinese government with no option but to cover huge environmental remediation costs, while those living near rare earth mines are directly or indirectly suffering environmental and health problems.

Another issue is that China is no longer simply a supplier and exporter or rare earths as domestic demand for these resources has increased sharply. China is the main driver of global investment in wind power. In a scenario for radical expansion of wind power produced by the National Development and Reform Commission's Energy Research Institute, China could see installed wind power capacity of 2,000,000 megawatts (2 terawatts) by 2050. A typical 2 megawatt turbine contains 341-363 kilograms of the rare earth neodymium and about 59 kilograms of dysprosium.

The quantities of rare earths needed just to allow for wind power growth are astounding, and this is before the increased rare earth demand arising from the "China Manufacturing 2025" plan, which aims to prioritise development in electric vehicles, marine engineering equipment and astronautic and aeronautic manufacturing, are considered.

China may not even be able to meet domestic demand, never mind increasing demand from other nations. According to UN Conference on Trade and Development estimates, global demand for rare earths will be between 200,000 and 240,000 tonnes annually by 2020, with 70% of that demand coming from China. Even if China makes full use of its entire mining quota, there is still a gap of 35,000 to 63,000 tonnes between new annual output and expected growth in demand. How will that gap be met?

Looking at rare earths throws up other unanswered questions about our low-carbon future. How will all that waste water be handled? Will there be new drinking water safety issues? Will the costs of better technology and management, intended to reduce emissions, be reflected in rare earth prices?

Back in 2014 the Chinese government declared a "war on pollution", which was followed up by "history's toughest" environmental protection law and standards for the rare earth industry on emissions and the use of water and energy. This means compliance costs for the industry are bound to rise; low-cost rare earth mining and processing are a thing of the past in China. EU and US research bodies have pointed out that there will be a shortage of light rare earths in the short and mid-term, while the shortage of medium and heavy rare earths will be in the mid and long-term. The combination of increased costs and shortages mean price rises are inevitable.

The world must ask if its low-carbon future may be limited by these "industrial vitamins".

Liu Hongqiao is an award-winning environmental investigative reporter based in Beijing.

神奇的鸟类
REMARKABLE BIRDS

几内亚动冠伞鸟 Guinean Cock of the Pock

非洲灰鹦鹉 African Grey Parrot

流苏鹬 Ruff

鹈鹕 Pelican

《神奇的鸟类》是一本出色的鸟类图集，向我们展示了全球上万种鸟类中的60种，以及它们与人类之间的关系。科学家、自然主义者马克·艾弗里为我们呈现了他从各种书籍、印刷物以及原始手稿中搜集来的图片，并配有各种与鸟类相关的珍贵的冷知识和趣闻。

艾弗里介绍了鸟类各种神奇的天赋：从雨林中以猴子和树懒为食的灵巧的捕食者角雕；到可以在冬天万里迁徙的体积微小的蜂鸟；再到南美雄性动冠伞鸟的极具攻击性的求偶仪式。

这本书同时也纪念了一些已经灭绝的物种，包括标志性的渡渡鸟以及不能飞行的巨型恐鸟。几个世纪以前，巨型恐鸟遭到新西兰殖民者猎杀，最终灭绝。艾弗里还强调了目前遭遇威胁的物种所面临的困境，例如全球最大的鸟类、翼幅达3米的加州神鹫。插图幻灯片将带您稍稍领略此书之美，希望您会喜欢。

"Remarkable Birds" is a beautiful compendium of illustrations showcasing 60 of the world's 10,000 bird species and our relationship with them. Scientist and naturist Mark Avery presents pictures from a wide range of books, prints and original drawings along with a treasure trove of bird related trivia and mythology.

Avery describes the remarkable talents of birds: from the skillful hunting of the Harpy Eagle, a rainforest predator of monkeys and sloths; the tiny Hummingbird that flies over 10,000-kilometre in an arduous winter migration; to the aggressive mating rituals of the male Cock-of-the-Rock from South America.

The book also serves as a memorial for those species lost to extinction; the iconic Dodo and flightless Giant Moas, hunted by the human colonists of New Zealand centuries ago, while highlighting the plight of species now under threat, such as the Calofornian Condor – the world's largest bird with its massive three-metre wingspan. These illustrations will give you a small taste of the book, we hope you enjoy.

李尔氏金刚鹦鹉
Lear's Macaw

美国新总统
全球气候谈判的隐忧

US Election Casted a Shadow Over Marrakech Summit

一年一度的联合国气候变化框架公约（UNFCCC）缔约方大会于2016年底在摩洛哥古城马拉召开。《巴黎气候协定》在不到一年时间里便正式生效，这令人们对马拉喀什峰会充满期待。各国谈判代表着重讨论的首要议题是如何落实《巴黎协定》。种种迹象表明，谈判一旦涉及执行细节，发达国家和发展中国家就会就责任分担问题争论不休。再加上对气候变化不以为然的特朗普当选美国总统，他若继续坚持竞选时期的主张，那么他的当选对于气候行动，特别是气候变化谈判来说，将会是一场灾难。如果特朗普真的宣布美国退出《巴黎气候协定》，那才是全球对抗气候变化行动的最大退步。

The annual summit of the United Nations Framework Convention on Climate Change (UNFCCC) convened in Marrakech, Morocco,in an atmosphere of hope following the Paris Agreement last year. The Paris Agreement came into legal force within less than a year of being signed. But that hope was also tempered by reality, as there was every indication that the developed versus developing world wrangling over who does what would continue to dog the negotiations.The election of Donald Trump may prove a disaster for the climate and especially for climate change negotiations if he sticks to the threats made during his campaign. The biggest setback to the global fight against climate change will be if Trump actually withdraws the US from the Paris Agreement.

伦敦办公室 / London Office

Suite 306 Grayston Centre,
28 Charles Square,
London, N1 6HT, UK

电话/ Tel：(+44) (0) 20 7324 4767

北京办公室 / Beijing Office

北京市海淀区中关村西区善缘街1号立方庭大厦2-123 (100080)

Rm.2-123 Core Plaza, NO.1 Shanyuan St.,
Haidian District,Beijing, China, 100080

电话/ Tel：(+86) 010 6241 6774

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