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海外投资
China Overseas

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关于“中外对话”

“中外对话”是一个独立的非营利性组织，以伦敦、北京、德里和圣保罗为中心开展工作。

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chinadialogue's primary vehicle is our website (http://www.chinadialogue.org.cn), a unique bilingual platform which promotes a global understanding of the environmental impact of China's rise by publishing informed articles, commentaries and analysis by writers from inside and outside of China. We aim to inform, educate, and contribute to building a global consensus on fair and workable solutions.

chinadialogue is now read in 208 countries and regions and in all regions of China.

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Produced on a bi-monthly basis, our journal brings you the best articles and reports from *chinadialogue*. If you want to contribute to the discussion you can visit our website (http://www.chinadialogue.org.cn) to add your comments and thoughts. Join the debate and be part of the solution.

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丝绸之路经济带
the Silk Road Economic Belt
21世纪海上丝绸之路
the 21st-Century Maritime Silk Road

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新“丝绸之路”会是一条绿色之路吗?

“一带一路”规划对于环境而言到底是福还是祸，它能否开创中国领导全球资源管理的新时代？

□ 莉莉·派克

骆驼换高铁，大篷车换电站，曾经的丝绸之路似乎正在走向复兴。2017年5月14到15日,“一带一路”峰会将在北京举行，与会各方将深入探讨古丝绸之路的复兴问题。如果单从丝绸之路的历史象征意义来看，你或许认为这次峰会不过是一群学者的神秘聚会，但是事实并非如此。本次峰会将是今年中国在地缘政治领域的一次核心活动，同时也是中国能否成为国际领导力量的分水岭。而“一带一路”计划也将在推动全球，特别是新兴经济体国家可持续发展的过程中发挥决定性作用。

与会各方大揭秘

作为习近平主席的一项重要议程，本次“一带一路”论坛将成为中国在国际舞台上召开的规格最高的会议之一。共有来自28个国家的领导人出席，而意大利总理则是唯一参会的七国集团（G7）国家领导人。此外，联合国、世界银行、国际货币基金组织的领导人，以及110个国家的代表也将参加本次会议。

本次大会首先将由习近平主席发表主旨演讲，随后是各国首脑参加的全体大会，以及一系列各方代表参加的平行讨论会。5月15日将召开专门的政策会议，讨论会议公报草案，最终文件可能会在峰会结束时公布。

什么是“一带一路”规划?重要性何在?

近些年来，中国不仅在国内取得了飞速发展，对拉美和非洲国家的海外投资和开发也引发了媒体的广泛关注。2013年，习近平主席首次提出了“一带一路”倡议，希望借此进一步推动海外开发。按照规划，中国将向古丝绸之路沿线的60多个国家投资大约4万亿美元。

根据2015年春季发布的《推动共建丝绸之路经济带和21世纪海上丝绸之路的愿景与行动》,“一带一路”规划分为“丝绸之路经济带”和“21世纪海上丝绸之路”两部分，主要是通过基础设施建设投资提高区域内部的互联互通。

目前,“一带一路”沿线已有部分项目开工建设。2016年8月，习近平主席宣布，中国已经与30多个沿线国家正式签署了共建“一带一路”合作协议，并且同20多个国家就铁路、燃煤电厂等900多个规划项目展开合作。

“一带一路”规划之所以重要，不仅仅是因为来自中方的巨额投资，更重要的是其政治意义。如今美国的政策正逐渐转向国内，而中国则希望通过“一带一路”规划开启更具包容性的“全球化2.0时代”。如果真是如此，中国将通过“一带一路”持续重塑传统的发展模式，并重新打造一种能够深刻改变现有全球治理的新体系。

“一带一路”的环境意义

中国对新丝绸之路展现出了前

新丝绸之路将帮助新兴经济体国家塑造可持续的全球发展模式

所未有的开发热情，而这对当地自然环境来说却是喜忧并存。2015 年颁布的《推动共建丝绸之路经济带和 21 世纪海上丝绸之路的愿景与行动》中要求，“强化基础设施绿色低碳化建设和运营管理，在建设中充分考虑气候变化影响。”

此外，中国社会科学院 2016 年发布的一份报告强调，“一带一路”规划是中国帮助发展中国家提高环境机构能力的一个良机。此外，报告还呼吁中国在政策、战略和规划阶段等多个层面展开全面的环境影响评估。

从陆上线路来看，中国的开发计划将会给丝绸之路沿线国家带来多重环境隐忧。从一开始，“一带一路”规划设定的一部分目标就是为了吸收中国钢铁和水泥行业过剩的产能，进而带动中国国内经济发展。而这种模式实际上走的还是高碳重污染的老路，很难帮助规划沿线国家减少对重工业的依赖。

从更广泛的角度来看，这就牵扯到了一些不必要的、利用率低的基础设施。亚洲开发银行预计，到 2020 年亚洲地区每年新建基础设施项目资金总需求为 7700 亿美元。机遇虽好，但是中国也必须审慎投资，避免不必要的资源浪费。

“一带一路”计划的一个焦点就是化石燃料相关的基础设施建设，比如新建一条横穿缅甸的输油管道，以及在巴基斯坦和东南亚地区建设多座燃煤电厂。虽然中国一直在国内和国际社会大力宣扬绿色能源的巨大潜力，但是这些煤电投资却会让上述地区背上化石燃料的枷锁。过去，中国的海外开发项目常常带来不少环境污染问题，比如在加纳进行的矿产开发就曾造成当地水资源污染。当地社区对这些生态环境破坏的各种疑虑使中方海外发展计划大受影响，比如此前缅甸方面就曾叫停了位于伊洛瓦底江的中国密松水电站项目。

然而，近年来中国一直在努力成为全球环境领袖。2016 年 8 月在杭州召开的 20 国集团领导人峰会（G20）上，中国公开表示将支持绿色金融发展，并在当年成为了绿色证券发行规模最大的国家，展现了其兑现自己诺言的决心。由中国牵头成立的亚洲基础设施投资银行（AIIB）承诺向丝绸之路沿线国家提供总额为 1000 亿美元的投资，同时还积极推动自身向“精简、廉洁和绿色”的目标进发，并在其《环境与社会框架》中承诺将帮助落实各国在《巴黎气候协定》中的承诺。此外，亚洲基础设施投资银行还在《2017 年能源规划草案》（2017 Draft Energy Plan）中承诺，只有在特殊情况下才会为燃煤电厂提供资金支持，而目前尚未有任何煤炭项目获得来自亚投行的投资。

中国一直在寻求绿色投资机遇，比如在巴基斯坦的太阳能和水电项目，以及大规模的铁路网建设等等。但是，除了个别机构之外，目前中国还没有为“一带一路”项目制订一套关于可持续发展的纲领性指导原则。国内外一些非政府组织已经承诺，将在“中国绿色领导力：一带一路绿色发展”项目的旗帜下，帮助中国完成相关指导文件的起草。

新丝绸之路计划对环境而言是福还是祸，它能否开创中国领导全球资源管理和可持续发展的新时代，都将取决于中国如何真正科学地落实“一带一路”规划。5 月召开的这次峰会或许将是前行的重要一步，我们也希望由此看出中国下一步的行动方向。

莉莉·派克，北京能源网络（Beijing Energy Network）执行董事

Will China's new Silk Road be green?

Will the Belt and Road Initiative bring environmental devastation or a new era of Chinese global resource stewardship?

□ Lili Pike

Trading camels for high-speed trains and caravansaries for power plants, the Silk Road is in the midst of a renaissance. On May 14 and 15, Beijing will host a summit to discuss the resurgence of the ancient routes. Given the historical symbolism you might think it will be an arcane assembly of academics. Instead, the meeting will be China's central geopolitical event of the year and a watershed moment in the country's ascent to global leadership. The Belt and Road Initiative (BRI) will play a determining role in shaping the sustainability of global development, particularly among emerging economies.

Who's going?

As President Xi Jinping's flagship initiative, the Belt and Road forum will be the highest level gathering for China on the international stage. Twenty eight foreign leaders are set to attend, although Italy's Prime Minister will be the only G7 head of state present. Heads of the United Nations, World Bank, International Monetary Fund, and representatives from 110 countries will also be there.

President Xi will launch the summit with a keynote speech, followed by a plenary session attended by heads of state and parallel sessions attended by representatives. A policy session will be held on May 15, where a draft communique is expected to be discussed and released at the end of the summit.

What is BRI and why is it important?

Alongside China's explosive domestic growth, the country has long been making headlines for its investments and development in countries from Latin America to Africa. The Belt and Road Initiative, launched by President Xi in 2013, plans to further this overseas development push, funnelling approximately US$ 4 trillion to over 60 countries.

According to the Belt and Road Action Plan released in the spring of 2015, the initiative will encompass land routes (the "Belt") and maritime routes (the "Road") with the goal of improving interconnectivity in the region primarily through infrastructure investments.

Projects along these routes are already underway.

> China has been pursuing green investments opportunities from solar and hydropower projects in Pakistan to vast rail networks. However, the country has not released any overarching guidelines for the sustainability requirements of Belt and Road projects beyond individual institutions.

President Xi announced in August 2016 that over 30 countries have signed formal agreements with China of which 20 were already planning projects from railways to coal-fired power plants, totaling over 900 deals.

The initiative is critical not just because of the scale of China's investment but because of its political implications. At a time when the US is turning inwards, through this initiative China is poised to launch "globalisation 2.0", a self-proclaimed "inclusive" mode of development. As such, the BRI will see China continuing to reshape traditional development paradigms and establish new institutions that could profoundly shift the dynamics of global governance.

What's at stake for the environment?

China's unprecedented development ambitions along the new Silk Roads come with both environmental concerns and opportunities in tow. The 2015 Action Plan states that "efforts should be made to promote green and low-carbon infrastructure construction and operation management, taking into full account the impact of climate change on the construction."

Furthermore, a 2016 Chinese Academy of Social Sciences report highlighted BRI as an opportunity for China to help developing countries improve their environmental institutional capacity, and called on the country to carry out environmental impact assessments at the policy, strategy, and planning phases.

On the ground, Chinese development overseas could pose concerns for the environment. From the outset, BRI was in part designed to absorb China's overcapacity in steel and cement production to boost the domestic economy. This perpetuates a carbon- and pollution-intensive economic model rather than helping the country wean itself from its dependence on heavy industry.

This is connected to the broader issue of building unnecessary or underutilised infrastructure. The Asian Development Bank estimates that Asia needs investment of US$770 billion a year for new infrastructure until 2020 but China must be careful to avoid throwing resources at white elephants.

A major focus of the BRI is developing infrastructure for fossil fuel resources, such as a new oil pipeline cutting through Myanmar and coal-fired power plants in Pakistan and across Southeast Asia. These investments could lock-in fossil fuel dependency in the region even as China trumpets green energy domestically and on the global stage.

Chinese projects have also been known to spawn pollution problems in the past, such as water pollution from Chinese mining in Ghana. Apprehensions about damage to ecosystems among local communities have compromised Chinese overseas development plans in the past, as was the case with the suspended Myitsone Chinese dam project on Myanmar's Irrawaddy River.

However, China has also been paving a path towards global environmental leadership in recent years. During the Hangzhou G20 summit in August 2016, China championed green finance and has since demonstrated its commitment as the largest issuer of green bonds in 2016.

New Chinese-led institutions such as the Asian Infrastructure Investment Bank (AIIB), which has committed US$100 billion to investment along the Silk Road, has promoted itself as "lean, clean and green" and in its Environment and Social Framework commits to helping

countries pursue their national commitments under the Paris Agreement. The AIIB also pledged to only fund coal-fired power plants under exceptional circumstances in its 2017 Draft Energy Plan and has yet to approve any coal projects.

China has been pursuing green investments opportunities from solar and hydropower projects in Pakistan to vast rail networks. However, the country has not released any overarching guidelines for the sustainability requirements of Belt and Road projects beyond individual institutions. A group of Chinese and foreign non-governmental organisations have committed to helping China develop such guidelines under the umbrella of the China Green Leadership: Belt and Road Green Development project.

Whether the new Silk Road brings environmental devastation or a new era of Chinese global resource stewardship and sustainable development will depend heavily on how China approaches the Belt and Road Initiative. The May summit will take us another step forward and hopefully show which route China wants to take.

In this article we have referred to the Belt and Road Initiative (BRI). It is worth noting that other names for the project include One Belt One Road (OBOR), the new Silk Road, the Silk Road Economic Belt and the 21st-century Maritime Silk Road.

Lili Pike is executive director of the Beijing Energy Network.

中国参与“一带一路”煤电项目的利与弊

北京召开“一带一路”峰会之际，中国在沿线国家参与的煤电项目因其对气候与环境的长期影响而成为关注重点之一。

□ 冯 灏

5月14日至15日，来自110多个国家的官员和领导人将齐聚北京，参加“一带一路”倡议提出以来的首次高峰论坛。2013年，中国政府提出丝绸之路经济带和21世纪海上丝绸之路（“一带一路”）这一雄心勃勃的倡议，希望通过加强互联互通的基础设施建设，激发从中国东南沿海延伸到非洲大陆的广袤地区的经济活力，并为中国产品、服务与资金打开新的市场。

印度裔加拿大国际关系学者阿米塔夫·阿齐亚将“一带一路”倡议代表的合作模式描述为“全球化2.0”，即以基础设施建设和投资而非单纯的国际贸易为基础的多边合作。

中国在“一带一路”国家参与的各种基础设施项目中，煤电项目因其气候环境影响和长达数十年的运转周期，成为中国国内和国际社会关注点之一。

截至2016年底，中国在带路沿线国家参与了240个煤电项目

参与规模总体上升

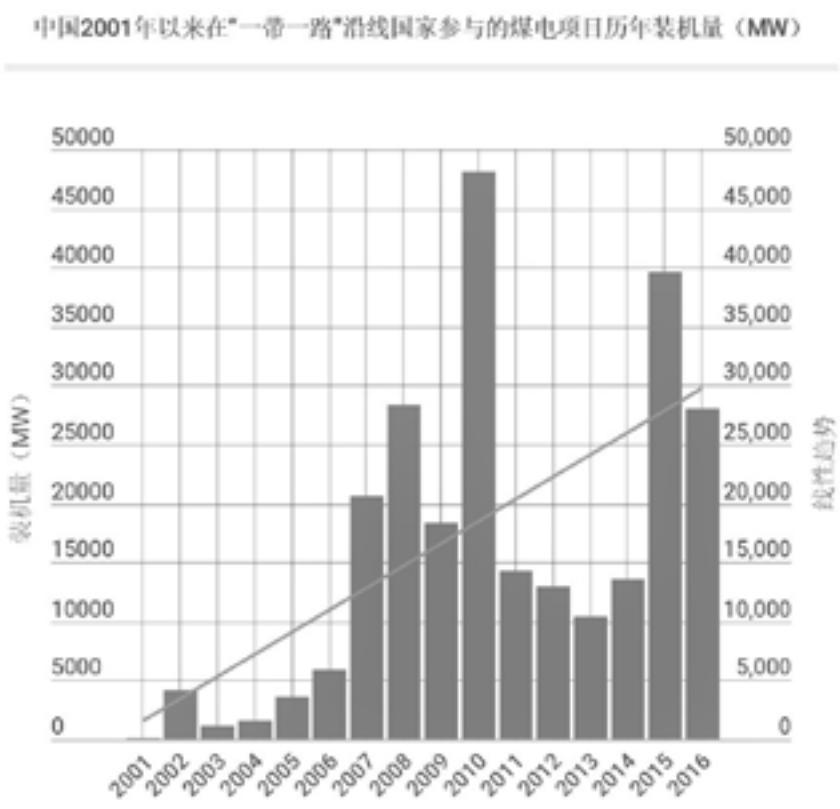
近日，全球环境研究所（GEI）就中国在“一带一路”沿线国家的煤电项目参与现状开展了基线研究，系统地梳理了2001年至2016年中国在65个带路沿线国家参与的煤电项目。

GEI数据显示，截至2016年底，中国在带路沿线国家参与了240个煤电项目，总装机量为251亿千瓦。

研究还发现，中国在“一带一路”沿线国家参与的煤电项目规模总体呈现上升趋势，但波动剧烈。“走出去”和“一带一路”倡议的提出曾带动总投资额大幅增长，但签署巴黎协定后的2016年，中国海外煤电项目的发展有所减缓。

风险预期增加

目前中国参与的煤电项目有超过40%处于计划（规划中和已签约）和建设中。研究认为，考虑到国际社



装机量包括新上线的装机量以及某一年份的计划装机量。数据来源:全球环境研究所 (GEI)

数据来源和图表：全球环境研究所 (GEI)

会对煤电越来越关切和能源结构加快转型的现实，这些项目的风险可能随之加大。

作为过去十五年中国海外煤电参与规模最大的带路沿线国家，印度于 2009 年出台了保护主义倾向的政策，禁止外商参与该国国内主要煤电项目，导致中国在该国煤电投资急剧下降。“2012 年以后由于政策和高关税的原因，印度的火电项目开发方就基本没有与中方签订任何设备购买合同了。这对一些印度企业来说是一个痛点。虽然由于项目周期的原因，一些原先签订的合同有可能还在执行，但多年以来都没有再现过面向中国的大额订单。”印度气候对话主编苏姆亚 . 萨卡说。

业内人士指出，基础设施的海外投资有诸多风险，外交、法律、政策都有不确定的因素长期存在，而且能源基础设施的建设运营周期很长，在东道国制度能力薄弱的情况下，还可能面临工程延期，使得预算超支。

煤电出海的经济原因

海外煤电投资具有种种风险。作为《巴黎协定》的缔约方，中国国内近年来去碳化的进程明显，煤电行业持续降温。国内发展机会的限制使煤电企业向外寻求机会。

此外，中国电力企业联合会国际合作部副主任吴添荣曾指出，当前，中国国内经济增长的减速导致电力投资下降，从而直接导致电力建设能力和装备制造产能的过剩。

与此同时，带路沿线国家电力设施建设的需求却日益高涨，“一带一路”倡议的实施为推进中国电力产能的国际化创造了条件。

海外煤电的争议

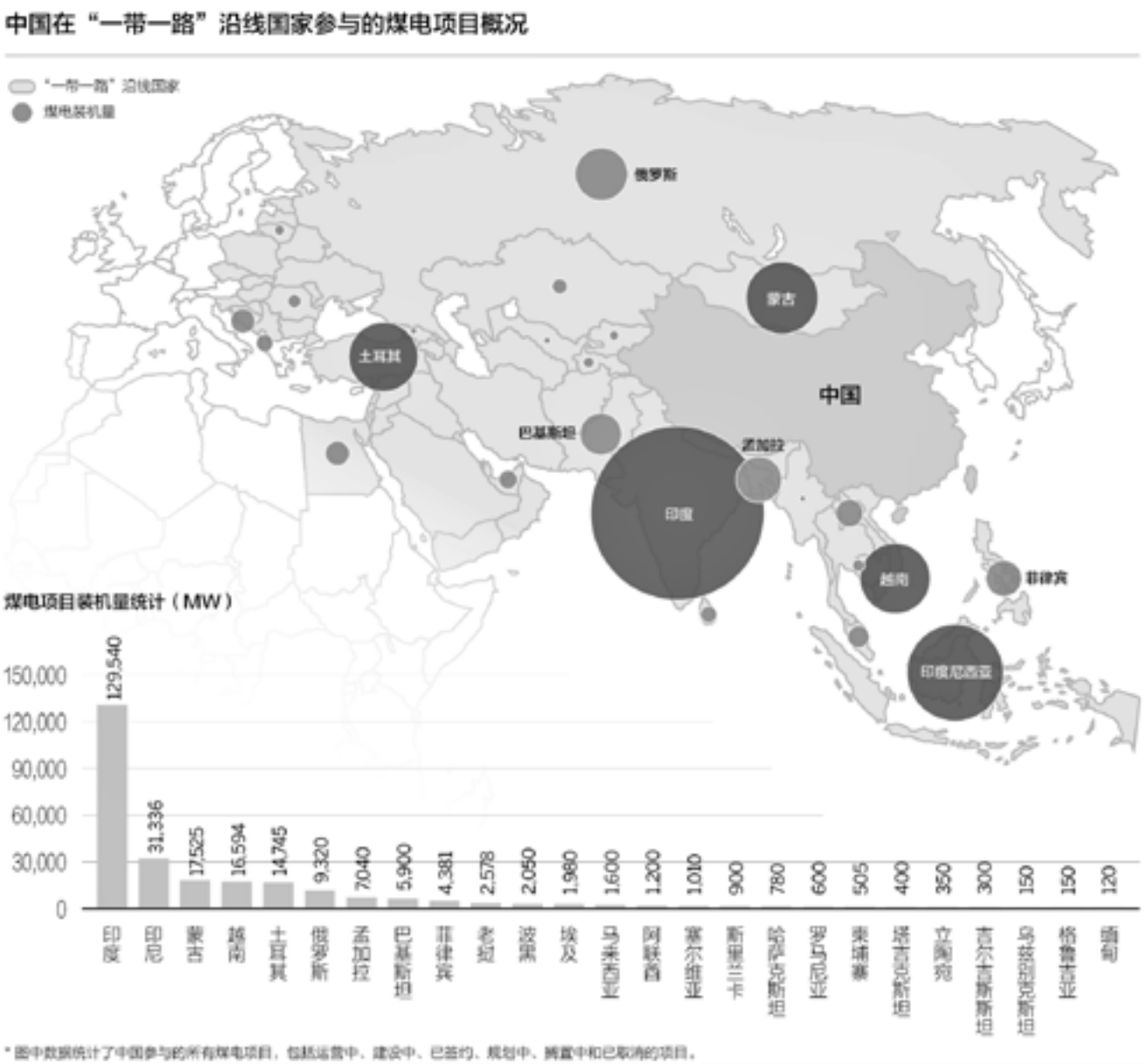
中国在海外的煤电投资被认为与中国国内积极进行的绿色转型背道而驰，有可能削弱中国和全球的气候行动。

一方面，在气候变化问题愈来愈急迫的背景下，世界银行和日本、韩国等 OECD 国家开始限制其对燃煤发电项目的财政支持，鼓励清洁低碳的能源形式。中国参与的海外煤电项目被认为具有“出口碳排放”的嫌疑。

另一方面，关于中国输出的燃煤电厂到底有多大的环境足迹和碳足迹，各方观点不一。

中国电力企业联合会电力市场首席专家，原国家电网能源研究院副院长胡兆光表示，中国“走出去”的燃煤机组在技术水平上是先进的，污染排放已经接近燃气机组的排放水平，且采用特高压等世界上最先进的输电技术，是环保高效的。

而中国社会科学院数量经济与技术经济研究所能源研究室主任刘强认为：“只要煤电项目达到当地的环保标准，就不应该作为批评中国的理由”。



数据来源和图表：全球环境研究所 (GEI)

但也有一种观点认为，接受中国煤电投资的带路沿线国家往往环境标准宽松，法律薄弱，不利于煤电厂的高规格排放控制。

除此之外，刘强还指出，中国海外能源投资不仅有燃煤发电机组，还有水轮发电机组、风电设备和光伏发电设备。中国在“一带一路”国家煤电项目与可再生能源项目投资的比例目前尚未有权威统计。要计算这些能源投资对东道国总体碳排放的影响，首先需要评估煤电项目与可再生能源项目的比例。

能源可及性与发展正义

对部分“一带一路”沿线国家来说，能源可及性仍是迫切需要解决的问题。亚洲基础设施投资银行（AIIB）此前估计，亚洲仍有 4.6 亿人无法享受到电力供应。应对气候变化之外，满足当地能源需求也是急迫需要解决的。

胡兆光告诉中外对话，中国海外投资的方向归根结底还是由投资东道国自身的资源禀赋条件决定的。煤炭作为当地最便宜的能源形式，是很多经济落后的带路沿线国家会优先选择的动力来源。

而亚太能源战略与经济咨询公司 The Lantau Group (TLG) 高级经理张柳潼指出，在欠发达地区，中国投建项目的成本优势至关重要。

从发展正义的角度出发，帮助发展中国家摆脱贫困也是衡量煤电项目社会效益的重要指标。刘强表示，在综合评价海外煤电项目的时候，最贫困人口能源可及性的提高同样需要列入考虑。

以巴基斯坦为例，近年来由于经济向好，其能源需求增长迅速，电力产能长期无法满足国家日益增长的用电需求。根据巴基斯坦《国家能源政策 2013》披露的数据，其电力缺口在之前五年中逐年扩大，到 2013 年，电力供给只能达到电力需求的三分之二。

电力缺口严重影响居民正常的工作和生活。近日来，当巴基斯坦港口城市卡拉奇多地再次陷入大规模、长时间的电力中断，当地居民走上街头抗议，甚至引发暴力冲突。

而以中国海外最大的煤电项目——巴基斯坦卡西姆港燃煤电站项目为例，作为中巴经济走廊的地标性建筑和首个落地的能源类项目，其装机容量为 1320 兆瓦，建成后将解决 400 万个家庭的用电需求。

中国官方媒体《人民日报》撰文称，除了极大缓解电力短缺之外，卡西姆项目在建设期为当地直接创造超过 3000 个就业岗位，运营期间每年将提供约 500 个就业和培训机会。

伦敦政治经济学院副教授金刻羽撰文指出，“一带一路”倡议的核心问题是它在经济上是否有其必要性，是否会带来显著收益，收益是否为多数人共享。

来自投资东道国的声音

然而，张柳潼介绍说，在菲律宾等国家，确实出现了针对中国投资燃煤电厂的反对之声，当地民众对中国煤电设备的稳定性和清洁性等各方面提出了质疑。

也有声音希望中国能够改变带路沿线国家能源参与的焦点。“印度的可再生能源发展目标非常雄心勃勃。中国作为可再生能源设备最大的出口国，可以在这一领域扮演更为积极的角色，”绿色和平印度分部的资深项目主任 Nandikesh Shivalingam 告诉中外对话。

印度于近期公布了一份国家电力计划，表示到 2027 年将大幅提高可再生能源在该国电力结构中的份额，并相应缩小煤电所占的份额。这对中国也许是个机会。“中国在印度的煤电参与正在减少，但它在印度太阳能领域的投资却在稳步增长。”印度投资研究公司 Equitorials 的创始合伙人 Jai Sharda 表示。

待解的难题

中国在“一带一路”的能源投资，能否超越东道国的发展阶段，直接进行绿色能源投资？专家认为，替代的清洁能源如水电、风电、光伏发电项目在当地是否可行，其环境和社会成本也需要具体项目的逐个考察。

此外，基本能源需求尚未满足的当地民众在多大程度上关心环境议题，如何平衡能源需求和环境目标将是中国和投资东道国需要共同解决的问题。

冯灏，中外对话研究员

China's Belt and Road Initiative still pushing coal

China's involvement in coal power projects abroad casts a shadow over its first Belt and Road Forum

□ Feng Hao

Officials and leaders from over 110 countries will gather in Beijing on May 14-15 for the first ever Belt and Road Forum. China's ambitious attempt to boost economic growth across a vast area stretching from its southeast coast all the way to Africa is known as the Belt and Road Initiative (BRI).

Its two parts – a Silk Road Economic Belt and a Maritime Silk Road – are focused on channelling enormous investment in infrastructure to connect the region and to open new markets for Chinese products, services and capital.

But the BRI is also causing concern within China and internationally because Chinese companies are investing heavily in coal power in BRI countries. The fear is that China will help lock developing countries into coal power assets that will last decades, damage people's health, and contribute to climate change.

Investments on the up

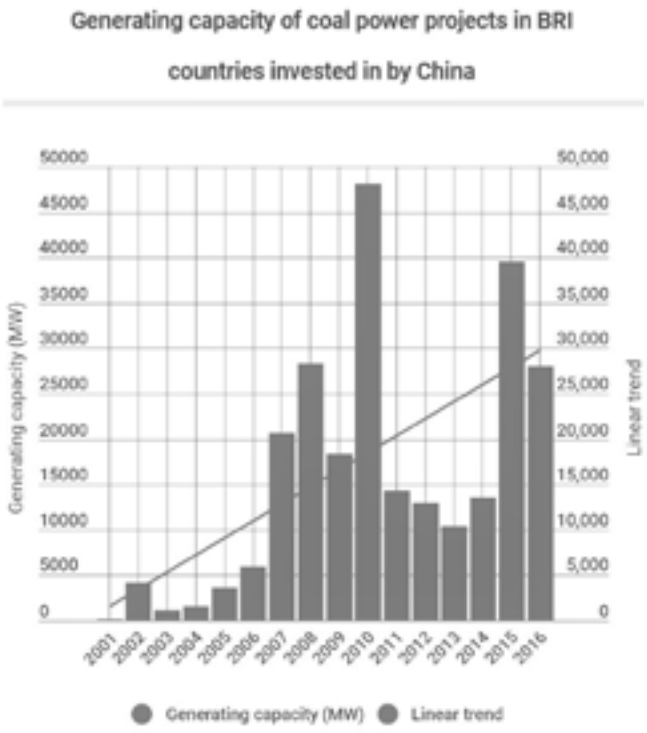
The Global Environment Institute (GEI) has recently carried out a long term review of China's involvement in coal power projects in 65 countries that are now participating in the Belt and Road Initiative.

GEI's figures show that between 2001 and 2016, China was involved in 240 coal power projects in BRI countries, with a total generating capacity of 251 gigawatts. The top five countries for Chinese involvement were India, Indonesia, Mongolia, Vietnam and Turkey.

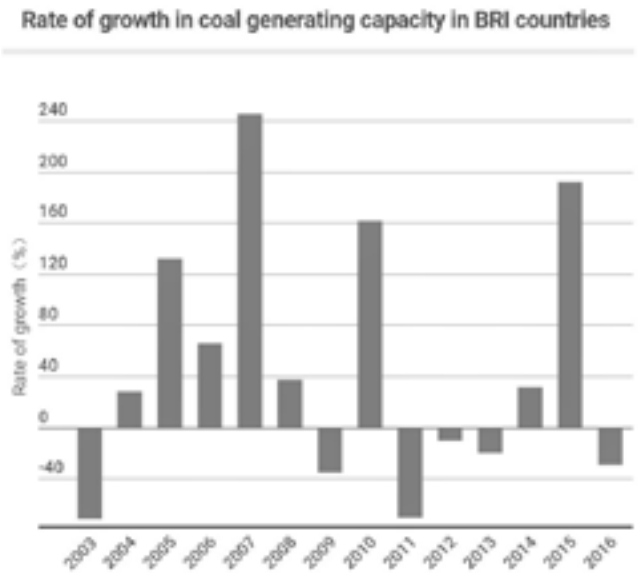
The GEI research also found that China's involvement in coal power projects in BRI countries, which often takes the form of contracting and equipment supply, has been increasing overall, despite large year-to-year fluctuations.

In the early 2000s Chinese enterprises were encouraged to acquire assets and expand business overseas as part of the government's Going Out Strategy, leading to an increase in overseas coal projects.

However, there was a steep decline in such projects in 2010 because of policy changes in countries receiving investment, particularly India, which adopted protectionist policies barring foreign participation in domestic coal power projects. Investment in overseas coal projects picked up in 2013 though with the launch of the BRI in 2013, and then slowed following the signing of the Paris Agreement in 2016.



Generating capacity includes new capacity going on-line and also capacity that is planned in a given year. Data: GEI



Data: GEI

Higher risk expectations

More than 40% of the projects China is involved in are currently in the preparation phase; with 7% still in planning, 15% with contracts signed, and 23% under construction. A further 48% are already in operation, with the rest either cancelled, suspended, or having unclear status based on publicly available information.

The research found international concern around the risks associated with coal projects. Interregional laws, diplomacy and national policy all have a bearing on the projected risk of investments.

For example, India, Indonesia and Mongolia have all adopted policies to increase the proportion of renewables in their energy mixes. Meanwhile India, previously the top destination of Chinese coal-power investment along the Belt and Road, has seen relatively little Chinese involvement since a ban on foreign participation in major thermal power projects in 2009.

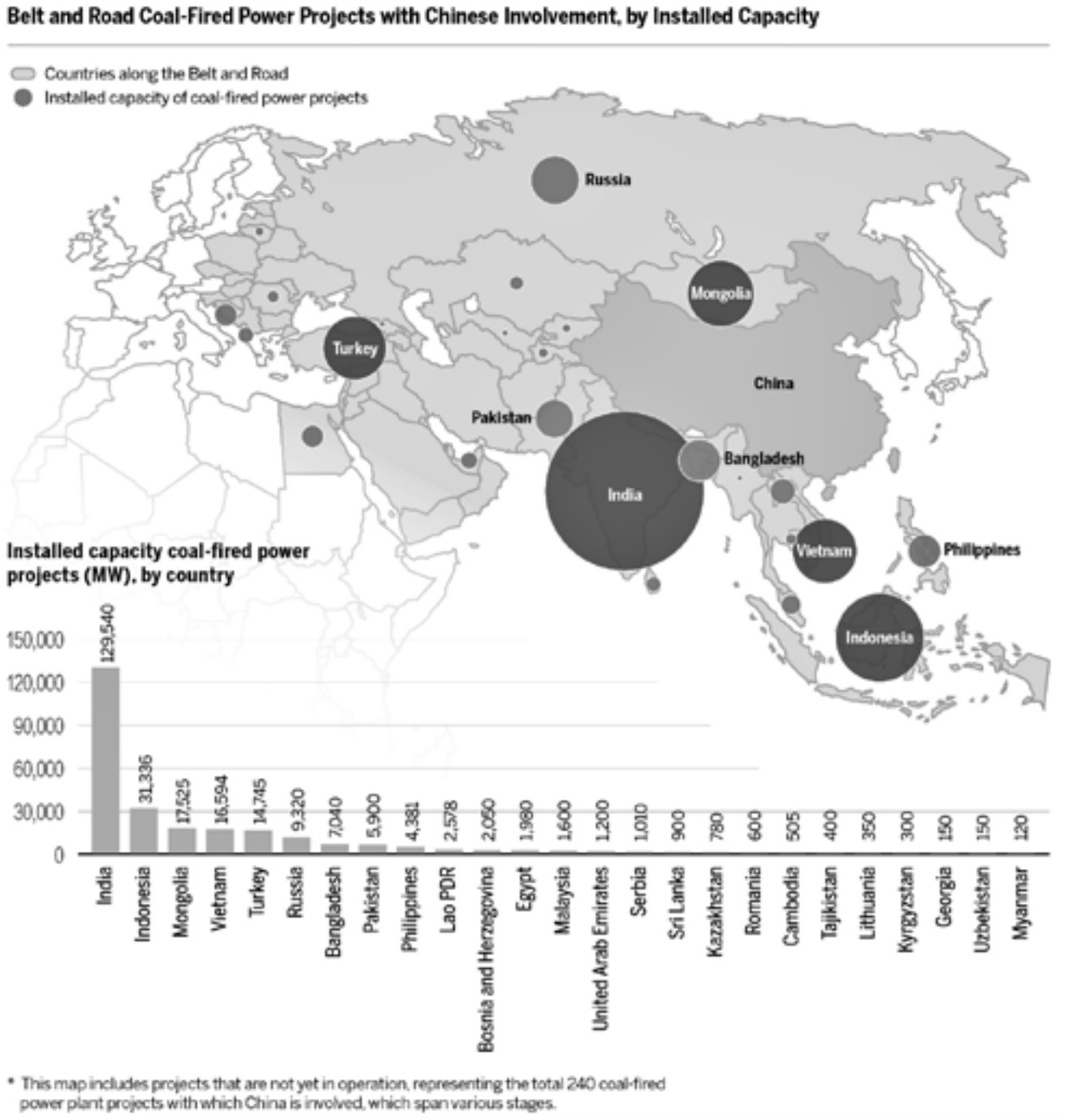
Limited opportunities at home

China's effort to reduce coal consumption has put a brake on growth in the sector domestically. In addition, slower economic growth in China has resulted in a decrease in power investments, leading to idle construction and manufacturing capacity, according to Wu Tianrong, director of the International Cooperation Department at the China Electricity Council.

This has fuelled concern that limited opportunities for domestic growth could lead China's coal power firms to look abroad for new opportunities. The BRI has created the conditions needed for Chinese power firms to work overseas, and there is also strong demand for new generating capacity among BRI countries.

Controversy over coal

However, China's involvement in overseas coal projects is widely seen as contradicting the country's promotion of a green energy transition at home, and potentially



Source: GEI

undermining global action on climate change.

With climate change becoming ever more pressing, the World Bank and Organisation for Economic Co-operation and Development (OECD) nations, including Japan and South Korea, have started to restrict financial support for coal power projects, instead encouraging green and low-carbon forms of energy. China's overseas coal power investments are regarded as possibly "exporting carbon emissions."

Opinions differ though on the actual size of the environmental and carbon footprints of exported coal-power technology.

Hu Zhaoguang, chief electricity market specialist at the China Electricity Council and former deputy head of the

State Grid Energy Research Institute, argues that China is exporting mostly advanced generation technology, with most types of emissions approaching natural gas powered equivalents.

Liu Qiang, head of the energy research office at the Chinese Academy of Science's Institute of Technical and Quantitative Economics, says that "there's no reason to criticise China if a project meets local environmental standards."

But laws and environmental standards in BRI countries receiving Chinese energy investments are often lax, meaning power plants are less likely to keep tight control on emissions.

Development justice

For some BRI countries, coal power remains attractive as a cost efficient means of widening energy accessibility. The Asian Infrastructure Investment Bank (AIIB) estimates that 460 million people in Asia still lack access to electricity, creating an urgent need to meet local energy needs that often trumps concerns about climate change and local air pollution.

Hu Zhaoguang told *chinadialogue* that China's involvement in overseas coal projects is determined by the investment opportunities present in the host countries. For many poorer BRI countries, coal is simply the cheapest available source of power, and that is why it's chosen.

Zhang Liutong, a senior manager at the Lantau Group, an Asia Pacific energy and economics consultancy, argues that in less developed regions, the cost advantages of Chinese-built projects are key.

In terms of development justice, Liu Qiang says that the poverty relief benefits associated with improving energy access through cheap coal power projects should also be considered when evaluating overseas coal projects.

The lack of energy access has severe impacts on lives and work. In Pakistan, where China is involved in 5.9 gigawatts of coal projects, economic growth has led to rapidly increasing demand for power but generation has long lagged. Over the past five years the country's energy gap has widened, with supply meeting only two thirds of demand by 2013.

The port city Karachi has recently seen widespread and lengthy power cuts, with local people taking to the streets to protest, leading to outbreaks of violence.

The Port Qasim Power Project, China's largest overseas coal power investment and the first energy project to be built on the China-Pakistan Economic Corridor, will supply 1,320 megawatts of power, meeting the needs of four million households.

Dr Keyu Jin of the London School of Economics has written that the key issue with the BRI initiative is "whether there is a clear economic case to be made. Is there a significant benefit, and will that benefit be shared among many?"

Local voices

In other countries, such as the Philippines, there has been widespread opposition to Chinese coal power investments, explains Zhang Liutong, with locals asking if Chinese equipment is reliable and clean enough.

Others are calling on China to shift its focus away from coal projects in Belt and Road countries altogether towards low carbon alternatives.

"Given that India has an ambitious renewable energy target and China being the largest exporter of renewable energy equipment in the world, there would be an opportunity for China to play a much more positive role," says Nandikesh Shivalingam, a senior campaigner with Greenpeace India.

> "It remains to be seen whether energy investments forming part of China's BRI will succeed in leapfrogging cheap coal investment."

India has recently published a draft National Electricity Plan that aims to rapidly increase the share of renewables in the country's electricity mix by 2027, presenting a major opportunity for Chinese companies.

"Chinese investments in Indian coal projects have been declining. At the same time, Chinese investments in India on solar projects are slowly increasing. In 2015, two major investments were announced by Sany Group and Chint group amounting to about US$ 5 billion of investment in Indian solar projects," says Jai Sharda, a founding partner at Equitorials, an equity research firm in India.

Hard questions

Although renewables such as wind and solar are rapidly falling in price, it remains to be seen whether energy investments forming part of China's BRI will succeed in leapfrogging cheap coal investment in favour of green energy. In the short term at least, a great deal will depend on examining the environmental and social costs of hydro, wind and solar projects on a project-by-project basis.

It will also be up to China, BRI countries and local communities where energy projects are proposed to work together to determine the balance between meeting urgent energy access needs with cheap coal and the broader concern of minimising local air pollution and carbon emissions.

Feng Hao is a researcher at chinadialogue.

揭秘中巴经济走廊重镇瓜达尔港

估值 600 亿美元的瓜达尔港会给当地经济和环境带来什么样的巨变？巴基斯坦人如何看待这一超级工程？

□ 佐费恩·易卜·拉欣

瓜达尔是通往石油资源丰富的中东以及中亚和南亚地区的门户

在巴基斯坦苏尔班达码头，一间破败不堪的茶馆旁，一条流浪狗正躺在一艘红色的小船下酣睡。港口里，几只小船随着阿拉伯海的波浪上下摆动。海水清澈见底，近岸可以看见一群鱼儿游来游去。渔民们聚在一起，一边喝着名为“doodh-patti”的甜腻饮料，一边悠闲地聊天。我问他们是否听说过宣传得沸沸扬扬的中巴经济走廊（CPEC），他们摇摇头。

这个港口宁静安详，但 20 公里外的瓜达尔港，一座据称可以将那个

沉闷的小镇变成国际级贸易中心的深水港正在施工当中。渔民们知道是中国在瓜达尔修建港口，不过他们连一个中国人也没见过。

这个深水港，正是中巴经济走廊的重要节点。中巴经济走廊总长3000公里，从中国西部一直延伸到巴基斯坦阿拉伯海岸边，一路上需要跨越喜马拉雅山区、印巴有争议的克什米尔地区、以及广袤的平原和沙漠，才到达历史悠久的瓜达尔渔港。走廊沿线，由中国提供资金的公路铁路交通运输网络以及电厂等大型基建工程也正在施工。走廊最初估值大约460亿美元，如今其价值预计已经升至620亿美元。

中巴经济走廊是中国一带一路倡议的一部分。一带一路是中国提出的大规模地区贸易和外交战略，是一条连接中国与亚洲其他地区、乃至欧洲的陆上和水上通道。

在建的瓜达尔港口所有权属于巴基斯坦政府下辖的瓜达尔港务局，经营权归中国国有企业中国海外港口控股有限公司（COPHC），经营期限为40年。对中国来说，瓜达尔临近阿拉伯海/波斯湾以及全球40%石油运输必经的霍尔木兹海峡，战略位置十分重要。可以说，瓜达尔是通往石油资源丰富的中东以及中亚和南亚地区的门户。

瓜达尔与中巴经济走廊

在瓜达尔之外的地方，执政的巴基斯坦穆斯林联盟没有一天不把中巴经济走廊挂在嘴上，没有一天不提到它会给巴基斯坦的广大领土——特别是瓜达尔的18.5万人口——带来怎样的繁荣。但渔民的声音却被淹没了。

近期在Dawn网站上发表的一篇关于中国中巴经济走廊规划的报道，似乎证实了当地人并没有参与中巴经济走廊制定过程的说法。

在苏尔班达，虽然没有官方的确认，但大量从瓜达尔港迁出的渔民将涌入这里的说法已经传开。

苏尔班达渔民协会（Anjuman Itehad Mahigiran Sur Bandar）主席萨义德·默罕默德表示，他从“知情人”那里了解到这一信息，但这些人具体什么时候迁入他也不知道。

“但是这里没有足够的地方供他们的船停泊，我们自己的船还停不下呢。”他指着泊船区解释说。

他说，苏尔班达大约有5000到7000个渔民和1000多只船，而瓜达尔渔民和船只的数量大约是这里的四倍之多。

瓜达尔开发局正在苏尔班达修建码头，当地居民猜想是用来接纳瓜达尔迁来的渔民。苏尔班达渔民说，这个码头的防波堤设计得很差，工程师在设计施工过程中也没有征求他们的意见。

瓜达尔渔民：其实不想走

瓜达尔渔民也听到了他们要被迁到苏尔班达的消息。

“我们不会离开的。”达德·卡利姆表示，“在这里我们一年四季都可以捕鱼。而在苏尔班达，六、七、八三个月渔民不能出海，因为浪太大了。”

他解释说，瓜达尔受锤头形状半岛的庇护，半岛两侧都是几乎完美的半圆形海湾，比苏班达尔安全得多。

“从我们家坐船到苏尔班达需要两个小时，”渔民纳西姆·格杰尔把墨镜架在头上，显得很时髦。“为什么他们不把我们搬到新毛拉班德？毕竟十多年前第一批搬迁的渔民就搬到那儿了。”

2007年，在港口一期建设施工阶段，位于港口现址上一个名为“毛

巴基斯坦瓜达尔港到中国西部地区的战略航线

拉班德”的有着百年历史的聚居区的数百户居民被迁到省首席部长家的附近。官方承诺给他们可以重新盖房的土地，还有现金。这个新的社区，就叫做新毛拉班德。

不过新毛拉班德的情况也不如杰格尔想象的那么好。“不能说我们没有拿到补偿，但是有些属于我们的地被黑帮强占了，”以前打鱼为生的萨勒·默罕默德表示。如今他在新的住地经营水泥生意。

另外，官方还承诺给他们修建一所医院、一所学校和公路。十年过去了，新毛拉班德仍然没有这些基本公共服务。唯一的一所学校离那里很远，并且老师也不怎么上班。

瓜达尔的情况也没有好多少，虽然他们在过去十几年中听到过各种各样的承诺。

巴基斯坦首相纳瓦兹·谢里夫今年早些时候到瓜达尔视察时曾表示，城市里要修建1100公里长的道路。“有了道路，其他的就好办了；学校会有的，大学会有的，医院也会有的……各行各业都会得到发展，进步和繁荣指日可待。”他说。

但目前，这座位于巴基斯坦最贫困省份之一俾路支的小镇，连基本的服务也没有。当地记者贝拉姆·俾路支表示，这里只有最基本的卫生医疗服务，对女性来说等于没有——如果碰上新生儿并发症，他们必须辗转到杜尔伯德甚至是近500公里外的卡拉奇。

职业培训：当地人能否受益？

中国企业声称，当地渔民的生计不会受到影响，港口工厂一旦建成，就会有大把的工作机会。“他们将被吸纳进与他们职业有关的活动当中，不管是渔业加工还是附加值业务。”COPHC的规划与开发部副经理、本地人达杜拉·优素福说。

他补充：“对于那些想要继续从事捕鱼的居民，我们会为他们提供技术、渔网、船只以及发动机，帮助他们出海。”

优素福说再过20年，瓜达尔港将有多达200万个工作岗位，在这里工作的不仅会有来自瓜达尔地区以及巴基斯坦其他地方的巴基斯坦人，还会有大约2万名中国人。“他们会从渔民那里按照市场价买鱼，这样一来消除了中间环节，渔民的利润可以最大化。”

但是渔民们并没有因此感到放心。随着越来越多技术工人涌入瓜达尔，技能和教育水平都不足的当地人很可能被边缘化。他们的恐慌是显而易见的。“除了打鱼，我们什么都不会。”无论到哪儿，你都能听到这样的话。

但本地的教师兼诗人K. B. 菲拉奇却不同意这种论调。他说，当地人确实需要新的生计以及职业培训，以防他们之前的饭碗丢了。

“现在开始做这些本来就已经迟了。实际上，在2000年港口施工开始之前，这就应该是首要的工作。”他感叹，“政府把发展等同于经济增长，对因此造成的社会成本一直不闻不问。当地人没有参与任何港口的活动，因为他们缺乏相应的技能。”

不过，港口当局计划在港口施工建设的第二阶段开展技能发展工作，并打算在瓜达尔修建一个职业技术培训学校。“可行性研究和设计工作已经完成，接下来几周就将正式启动。学校建好之前，将在瓜达尔公立学校老楼里开课。我们计划装修17间教室，并在两个月内开设马达转子绕线、起重机和叉车维护、焊接还有中文等方面的课程。”他说。

但是即便当地人掌握了这些技能，收入却未必会相应增加。渔民每周收入可达2万到5万巴基斯坦卢比（约合188到471美元）。港口不熟练工人的月薪只有2万巴基斯坦卢比，熟练工人的月薪只有2.8万到5万巴基斯坦卢比(约合264到471美元）。

港口开发进展缓慢

对于800多名中国和巴基斯坦工作人员来说，在建的港口和自由港区则是一片荒凉之地。达杜拉·优素福说，这片地区被驻扎在港口内的300多名巴基斯坦海军用警戒线隔离起来。

我到这里时候，没有船只停泊，也没有卡车装卸货物。瓜达尔港务局主席私人秘书沙比尔·阿赫迈德告诉我平日常有“船只来来往往”，我只是碰巧赶上一个难得的清静的日子。他是港口工作时间最长的员工之一，自从2004年就在这里工作。

自从2008年3月第一艘船只在这里停泊开始，大约有200艘船曾在这里停泊，带来了麦子、化肥、椰枣、骆驼。“到目前为止，这里向外输出的货物只有巴基斯坦出产的成集装箱的沙丁鱼。”优素福说。

港口一期项目由中国和巴基斯坦联合开发，总成本170亿巴基斯坦卢比（约合2.88亿美元），2007年3月正式落成。根据一份长达40年的特许协议，港口控制权随后交给新加坡港务局（PSA）。

不过，PSA 经营失败，特许控制权也于 2013 年交回给 COPHC。

目前正常情况下，港口可以停泊两到三艘载重吨位达到 5 万（DWT）的大型船只。到 2045 年，港口将可以停泊 150 艘船只，容纳多达 4 亿吨货物，并拥有多种物流服务、一个大型存储仓库以及一片九平方公里的工业自贸区（GPFZ）。自贸区一期工程将于 2018 年初完工，包括一个管道生产厂、一个冷藏渔业加工区、一个电动自行车生产厂以及中国产品的展示区。整个自贸区将在七到八年内实现完全运营，届时将可以容纳超过 400 家公司和巴中合资企业。

电力和水资源危机

在港口内，人们会错觉瓜达尔的电力、天然气和水资源供应是取之不竭的。港口自己发电，通过淡化海水提供自己的水源。但这些奢侈的资源只在港口还有城镇上的五星级酒店才能享受到。城镇上的其他地区则必须忍受长时间的断电。

尽管瓜达尔四周都是深海，但水资源却很紧张——毕竟这里是长期饱受饮用水短缺之苦的沙漠小镇。

一旦港口活动增多、瓜达尔港自由区（GPFZ）建成之后，对于水和电的需求将大幅增加。为了满足这些需求，政府希望在距离瓜达尔 40 公里的卡拉瓦特修建两座 15 万千瓦的火力发电厂，预计成本 550 亿巴基斯坦卢比（约合 5.2 亿美元）。

达杜拉·优素福坚持 GPFZ 不会使用火电。“我可以向你保证；我们刚刚和投资者签订了环境协议，声明我们不会使用肮脏燃料。”他说。

此外，政府制定了一份 2050 年瓜达尔水务总体方案，以求解决包括水资源供给、分配、污水收集和处理在内的水资源相关问题，预计成本约为 1.3 亿美元。

不过城镇居民要求现在就向他们供应饮用水。附近的安卡拉·卡吾尔水坝无法完全满足当地的用水需求。这个城市现在每天需要 460 加仑淡水，但到 2020 年，这一数字会飙升至 1200 加仑。新的水坝项目正在规划当中，一座拟建的海水淡化厂以后也可以向当地居民供应清洁淡水，只是眼下落实的工作还不多。

当地居民说，他们在过去五六年里一直面临着持续的水资源危机。政府必须周期性地采取紧急措施，用水罐车从附近的米拉尼水坝和贝拉尔水坝调水。

港口的中国人

对于贾先生来说，在瓜达尔港的日子简直就像在服刑。作为 COPHC 的经理，他用工作把自己的日程填满。“老实讲，如果你问我瓜达尔是什么样子的，我回答不出来；我基本没有体验过这个城市的生活，因为要体验一个地方的生活，需要与别人经常碰面，了解他们的文化、音乐、生活方式和他们的政治。”

他养成了一个新的爱好——钓鱼。不过这也是受到限制的，因为他只能在港口水道里进行垂钓，还必须在海岸警卫队的注视之下。

他有时候也会进城，不过总是跟着一大帮安全人员。当地人总是想拍他的照片。“即便是这种时候安全人员还是十分严厉，我就经常告诉他们不要阻拦大家跟我们自拍，没什么问题的。”他说。

港口内有超过 300 名中国人，他们中有新手工人，熟练工程师，也有高级管理人员。出于安全原因，他们都生活在一个仅用两个月时间建的独立的生活区里。这是他们在遥远异乡的家，虽然看上去粗糙简陋，但却拥有一个健身房、一个乒乓球和台球室、一个卡拉 OK 房，甚至还有一片面积不大的人工草皮足球场。他们每工作六个月，就可以回到中国休三周的探亲假。

对于 COPHC 董事长张保中来说，挑战在于如何让 20 年后的瓜达尔“既不是迪拜，也不是深圳，而是一个比两者都好的城市”。他身着一身干练的白色纱丽克米兹——这是当地传统服饰，头发梳得整整齐齐，面带温和的微笑。他说在他眼中，瓜达尔原本是一张白纸，但等到中国人完工回家的时候，当地人的生活必将“更加幸福、更加繁荣”。

“那样的话，这一切就都值得了。”他说完这话，就离开去向中国大使汇报工作去了。

佐费恩·易卜·拉欣，巴基斯坦自由撰稿人

What's happening at Pakistan's Gwadar port?

Despite big promises, the China-Pakistan Economic Corridor is yet to deliver local benefits

□ Zofeen T Ebrahim

A stray dog snoozes under a red boat lying next to a rickety tea shop on the quay at Sur Bandar, where a few dozen small boats are bobbing in the Arabian Sea. The water is clear and a school of fish is swimming near the shore. The fishermen gather and chat over cups of a strong, sweet concoction they call "doodh-patti", as they watch the world go by. I ask some if they have heard of the much-touted China Pakistan Economic Corridor (CPEC), but they shake their heads.

The harbour front is quiet compared to the one at Gwadar, some 20 kilometres away, where a Chinese deep sea port is under construction, promising to transform the sleepy town into a global trading hub.

CPEC is a 3,000-kilometre corridor from Kashgar in western China to Gwadar in Pakistan on the Arabian sea. It slices through the Himalayas, disputed territories, plains and deserts to reach the ancient fishing port of Gwadar. Huge Chinese funded infrastructure projects, including road and railway networks as well as power plants, are being built along the way. Originally valued at US$46 billion, the corridor is estimated at US$62 billion today.

CPEC is part of China's Belt and Road Initiative (BRI), a massive regional trade and diplomatic venture that covers both land and maritime routes linking China to the rest of Asia and to Europe.

The port under construction at Gwadar is owned by the Pakistan government's Gwadar Port Authority (GPA) and operated by state-run Chinese firm China Overseas Port Holding Company (COPHC), which will run it for 40 years.

For China, Gwadar is strategically perched near the Arabian or Persian Gulf and close to the Strait of Hormuz, through which an estimated 40% of the world's oil passes. Gwadar is a gateway to the oil rich Middle East, and central and South Asia.

Gwadar and CPEC

Elsewhere in Pakistan, not a day passes without someone from the ruling Pakistan Muslim League making a reference to CPEC or how it will bring prosperity to the length and breadth of Pakistan, and in particular to Gwadar. Yet the voices of fishermen in Gwadar – who make up 80% of the district's 185,000 inhabitants – have been largely ignored.

A recent report showcasing Chinese plans for CPEC, published by the newspaper *Dawn*, appears to validate the notion that locals are not contributing to the development of CPEC.

In Sur Bandar, rumours are rife that there will be an influx of fisherman who've been displaced by the Gwadar project.

Saeed Mohammad, president of the Anjuman Itehad Mahigiran Sur Bandar (the Sur Bandar fishermen organisation), says he has heard from "those in the know" that it will happen but does not know when.

Fishermen in Sur Bandar

"There is not enough space for their boats to berth here, it's not even enough for us," he exclaims, gesturing to the docking area.

There are about 5,000-7,000 fishermen with 1,000 or so boats in Sur Bandar, he says, while the number in Gwadar is about three times that.

The Gwadar Development Authority is constructing a jetty at Sur Bandar, which the residents suspect will eventually accommodate the fishermen from Gwadar. The fishermen say the jetty's breakwaters have been badly designed and that engineers failed to consult them in the process.

Reluctant migrants

The fishermen in Gwadar are also concerned that they will have to relocate to Sur Bandar.

"We will not leave," says Dad Karim. "This is the spot where we can fish all year round. At Sur, there are three months – June, July and August – when fishermen cannot go out to sea due to high waves."

Gwadar, he explains, is naturally protected by a hammerhead-shaped peninsula, which forms two almost perfect semi-circular bays on either side.

"It will take us two hours by boat to reach Sur because our homes are here," says Naseem Gajar, a fisherman with dark glasses fashionably perched on his head. "Why don't they shift us to New Mullah Band where they shifted the first set of fishermen some ten years back?"

In 2007, during the first phase of the construction of the port, about a hundred families living in a century-old settlement known as Mullah Band were relocated. They were promised alternative land to build homes, plots in a housing project and cash.

"I wouldn't say we were not compensated, but some of our property has been grabbed by the land mafia," says former fisherman Saleh Mohammad, who now works in the cement business.

In addition, they were promised a hospital, a school and

Fishermen are concerned about being displaced from Gwadar as the port infrastructure develops

proper roads. Ten years later, the new Mullah Band still has none of these basic services. The only school is far away and the teacher seldom turns up.

Not that the situation in Gwadar is much better, although they have heard many promises in the last 12 years.

On his visit to Gwadar earlier this year, Pakistan's Prime Minister Nawaz Sharif said 1,100 kilometres of road would be built within the city. "When roads are made, success follows; schools are built, colleges are built, hospitals are built…industries are established and progress and prosperity flourish," he said.

Currently the town, which is situated in one of Pakistan's poorest provinces, Balochistan, lacks even basic services. A local journalist, Behram Baloch, says healthcare is rudimentary and for women it is almost non-existent. For childbirth complications they must travel to Turbat or even Karachi, nearly 500 kilometres away.

Vocational training – will locals benefit?

The Chinese company says the fishermen's livelihoods will not be affected and that once the port factories are set up there will be no shortage of work. "They will all be absorbed in activities related to their own occupation be it fish processing, or value addition," says Dadullah Yousaf, a local working with the COPHC as deputy manager in planning and development.

He adds: "Those who want to continue fishing will be provided with technology, nets, boats and engines for them to go out to sea."

Yousaf says that in 20 years there could be as many as two million people employed in Gwadar from the local area, elsewhere in Pakistan and several thousand Chinese workers. "They will buy fish from the fishermen at market rates and eliminate the middlemen so [local fisherman will] make maximum profits."

But the fishermen do not feel reassured. Despite new jobs opening up for skilled workers in Gwadar, locals with fewer skills and no education fear that they will be left behind. "We do not know anything other than fishing", is a

refrain you hear wherever you go.

But local teacher and poet Mr Firaq disagrees. He says new livelihoods for local people and vocational training are needed in case their occupations are lost.

"We are already late. In fact, this should have been a priority even before the construction of the port began back in 2000," he laments. "Development is associated with economic growth and the social and human cost remains off the state's radar. The locals were never involved in any port activity because they are not skilled."

However, the port authorities are planning for skills development in the second phase of construction with plans for a vocational training institute in Gwadar. "Until the institute is set up, the GPA will hold classes in the old building of the Gwadar Degree College. There are 17 classrooms there which we plan to renovate and within two months begin the courses in motor winding, crane and fork-lifter maintenance, welding and Chinese language," he said.

But even if the locals acquire those skills, they may find it difficult to earn as much as they do now. In a week, the fishermen can make from PKR 20,000-50,000 (US$188-471). The wages of an unskilled worker at the port are not more than PKR 20,000 a month, and those of skilled labour, somewhere between PKR 28,000-50,000 (US$264-471) a month.

Port development – slow to launch

For the nearly 800 strong Chinese and Pakistani workforce the port and free zone is a forlorn place. The area is cordoned off by about 300 men from the Pakistan Navy stationed inside the port, says Dadullah Yousaf.

When I visit, there are no ships berthing or trucks loading and unloading. Shabbir Ahmed, the private secretary to the chairman of the Gwadar Port Authority, assures me that the "ships come and go" and I just happen to have come on an

A fishing boat under construction

unusually quiet day. He is among the oldest hands at the port, having been employed there since 2004.

Since the first ship berthed in March 2008, around 200 ships have arrived, bringing anything from wheat to fertiliser, dates to camels. "So far, we have only shipped out containers of sardines from Pakistan," says Yousaf.

In its first phase, the port was developed jointly by the governments of Pakistan and China at a cost of PKR 17 billion (US$288 million) and inaugurated in March 2007. Control of the port was then handed over to the Port of Singapore Authority (PSA) under a concession agreement for 40 years.

However, PSA was unable to expand or bring business to the port and concessional rights were transferred back to the COPHC in 2013.

At any given time, the port can berth two or three large ships with capacity of 50,000 DWT (dead weight tonnage). By 2045, the port will be able to berth 150 ships and cargo up to 400 million tonnes, and will have multiple logistics services, a huge storage facility and a nine-square kilometre industrial free trade zone (GPFZ). Phase one of the GPFZ will be ready by early 2018 – and will include a pipe plant, a cold storage and fish processing area, an e-bike factory and display centres for Chinese goods. The entire zone will be fully operational in 7-8 years and house over 400 companies and Pakistani-Chinese joint ventures.

Power and water crises

Inside the port, one can be forgiven for thinking there is an endless supply of electricity, gas and water. The port generates its own electricity and desalinates water. But these luxuries are only available at the port or in the town's only five-star hotel. The rest of the town must contend with long power outages.

Despite being surrounded by deep sea, water is a precious commodity in Gwadar – a desert town suffering from chronic drinking water shortages.

Once the port activities expand and the GPFZ develops, it will need much more water and electricity. To meet these needs, the government wants to build two coal-fired power plants of 150 megawatts each at Karwat, about 40 kilometres from Gwadar, at a cost of PKR 55 billion (US$520 million).

"The port generates its own electricity and desalinates water. But these luxuries are only available at the port or in the town's only five-star hotel."

Dadullah Yousaf insists the GPFZ will not use any electricity that is produced from coal. "I assure you; we've just signed an environmental agreement with investors stating we will not use dirty fuel there," he says.

The government is drawing up a 2050 plan for Gwadar to take care of all the water woes including its water supply, distribution and sewerage collection and treatment plants at an estimated cost of US$130 million.

Meanwhile, the townspeople are clamouring for potable water now. The nearby Ankara Kaur dam does not fulfil local needs. The city requires 4.6 million gallons of water per day but is expected to need 12 million by 2020. New dams are in the pipeline and a planned desalination plant may provide clean water to the local people. However, there is little to see on the ground.

Locals say they have faced an ongoing water crisis for the past five to six years. The government periodically must take emergency measures to provide water from the Mirani and Belar dams through tanker deliveries.

The Chinese at the port

A manager with the China Overseas Port Holding Company (COPHC), Victor Jia keeps himself busy with work. "Honestly, if you ask me, I cannot tell you what Gwadar is like; I have hardly experienced what it is to live in this town and you can only do that if you meet the people freely and

get acquainted with their culture, their music, their way of life, and politics."

He has found a new hobby – fishing. Although that is restricted, too, as he can only fish at the port and just inside the channel under the constant gaze of the marine security agency.

When he does go out to the city, it is always in a group and surrounded by security people. Locals always want to take his photograph. "Even then the security people are very strict, but I often tell them it's ok to let people take selfies with us," he says.

There are over 300 Chinese people working as both unskilled workers and skilled engineers and in senior management positions living inside the port. For security reasons, they all live in a community that was built in just two months. A home away from home, it looks spartan, but has a gymnasium, a table tennis and snooker room, a karaoke room and even a mini astro-turf football field. They work for six months and get three weeks off to go back to China.

For Zhang Baozhong, chairman of the COPHC, the challenge is to see Gwadar in 20 years, "not as Dubai, not even Shenzhen but a city far superior than either". Dressed in a crisp white shalwar kameez, hair neatly combed, and a warm smile, he says he looks at Gwadar as a "clean slate" and once the Chinese return home they will leave behind a "happier, more prosperous people."

"It will all be worthwhile then," he says, before leaving to make a presentation for the Chinese ambassador.

Zofeen T Ebrahim is a freelance journalist based in Pakistan.

亚投行年会：两项重大决策值得关注

能源行业战略最终版本够不够清洁？
是否在印度投资高环境风险的金融中介？亚投行年会的两大看点呼之欲出。

□ 凯特·吉尔里

本周，全球最年轻的多边银行——由中国倡议设立的亚洲基础设施投资银行（亚投行，AIIB），将在韩国济州岛举行第二届理事会年会。首届年会于去年在北京举行，主要是为了庆祝亚投行的成立。本届年会将面对真正的考验，即定位亚投行将成为怎样的投资者，以及对亚洲和世界未来的影响。

行长金立群反复强调，亚投行的治理理念是“精简、清廉和环保”，董事会即将做出的两个决定将是对这一理念极大的考验。

首先，亚投行董事们将通过新的《能源行业战略》。该战略的一份外泄版本显示，亚投行明确承诺将支持《巴黎气候协定》及联合国可持续发展目标。对气候行动和贫困社区的能源普及来说，这是好消息。

不过，很多民间社会组织人士对这一战略没有明确要求亚投行停止对煤炭的投资感到担忧。例如，印度31家民间社会组织就致信亚投行说：“我们仍很担心，所谓的‘环保’银行最后还是会资助燃煤和天然气电厂这样的肮脏能源，因为它们没有被明确排除。其他多边发展银行都已经放弃对煤炭的投资，亚投行不应打破这一良好的局面。”

亚投行政策和战略负责人约阿希姆·冯·阿姆斯贝格去年十二月在伦敦举行的一场会议上让这些组织放心：“不要凭文字来评判我们，而要看我们的投资组合”。换句话说，我们评价亚投行是否做到“精简、清廉和环保”要看的不是它的政策，而是投资选择。

金融中介蕴含隐患

其次，亚投行董事会将做出第二个重要决定：是否投资1.5亿美元设立印度基础设施投资基金。这种“放养型”融资模式风险极高，因为它允许投资给商业银行或基础设施基金等金融中介机构，再由中介机构转贷给子项目或客户。越来越多的证据显示，这样的融资模式很容

亚投行已经有转贷相关的标准，但尚不足以防止社会和环境受到危害

易导致主投资银行的社会和环境标准被稀释，并且失去透明度。

亚投行此次投资计划是其第二个此类中介投资项目，第一个是印度尼西亚极具争议的区域基础设施发展基金。亚投行已经有转贷相关的标准，但尚不足以防止社会和环境受到危害，也无法及时发现高风险的借贷——如对煤炭的投资。

亚投行的同行国际金融公司（IFC）在这方面就经历了惨痛的教训。该公司一半以上的贷款都是通过金融中介机构放出的，并于 2008 年投资了一个也叫印度基础设施投资基金的中介机构，该基金在奥里萨邦投资了一家大型煤电厂，致使当地社区向 IFC 负责监管的合规顾问 / 投诉办公室（CAO）发出正式投诉。目前，该印度基础设施投资基金三分之二的能源客户与印度各式各样的煤电厂和矿山有关联。CAO 调查发现，IFC 违反了所有关键的环境和社会政策，包括信息公开、风险管理、尽职调查和监督管理。

IFC 新任首席执行官菲利普 · 勒奥鲁近来承认，中介贷款本身存在高风险。他首次承诺“IFC 将减少对高风险金融中介活动的参与，并且在选择包括股权投资在内的此类投资时也将更加谨慎。”IFC 还承诺将对自身通过金融中介参与的煤炭项目投资情况进行跟踪。

这对将于下周召开会议的亚投行董事会而言，应该是一记警钟。是否投资印度基础设施投资基金的决定，将成为亚投行能否吸取同行经验教训、做出正确的决择的一个重要检验。

与冯 · 阿姆斯贝格先生所说的正相反，仅关注亚投行的投资组合是远远不够的。银行必须有强有力的政策，确保不会伤害民众和环境。亚投行董事会面临着一个关键问题：新的能源战略加上它的环境与社会框架，是否足以确保它能及时发现印度基础设施投资基金这样的金融中介机构投资的高碳、高风险项目？

印度融资问责制研究中心和 BIC

欧洲上月发表的新报告指出，亚投行需在一些领域收紧政策、填补危险漏洞。例如，亚投行应公开高风险子项目的信息；不要将执行安全保障的责任全部下放给金融中介机构；应当明确规定《能源行业战略》适用于其所有直接和间接的贷款组合。该报告警告称，亚投行目前的政策不足以防止其陷入和 IFC 一样的困境。

如何确保投资项目惠及人民？

但还有一个问题：好政策只有执行了才是真的好。这里就涉及到金行长“精简、清廉和环保”理念的一个内在矛盾。把理念付诸行动，确保亚投行投资低碳能源未来，需要人——不只是项目人员和投资经理，还要有创新基础设施解决方案和社会环境影响评估领域的专家。最重要的是还需要项目规划所在地的当地群众的参与。项目地点的实际情况决定着一切，亚投行不能像现在一样，希望单靠测量生产的电量来估算自己是否达成了电力普及目标。而是要考虑，怎么才能保证首当其冲受到项目影响的当地社区也能用上项目生产出来的电？

亚投行成立后第一年 75% 的项目都是与世界银行、亚洲开发银行等其他银行联合投资的。亚投行表示，希望通过这种方式学习借鉴他人的经验。但这样一来，它也把保护社会与环境、管理项目成果的责任推给了搭档。

过度依靠搭档引发的问题已经浮现。例如，亚投行和世界银行在巴基斯坦共同投资了塔贝拉坝的一个扩建项目。之前修建塔贝拉坝和下游的巴罗塔水电站项目已经导致该地区数万人被迫搬迁。时至今日，很多人还没拿到应得的赔偿。这些项目的历史遗留问题，都交给了世界银行处理。此次两行合作中也全靠世界银行来管理项目的环境和社会计划。但作为一个承诺会解决过往危害的联合投资者，亚投行必须承担起同等责任。

一些成员国已经私下表达了自己的担忧，认为亚投行有些操之过急，相关政策和体系还没完善到位，董事会就被要求批准印度基础设施投资基金、缅甸敏健天然气发电厂这样的高风险项目。

亚投行的公共信息政策仍是“临时的”，在所有多边银行同类政策中最不完善，急需修订。与此同时，亚投行的问责机制仍在建设中，此机制无论是作为弥补当地社区所受伤害的手段，还是对于推动银行本身从错误中吸取教训，都是至关重要的。

本周，亚投行将成为全球关注的焦点。随着美国宣布退出《巴黎气候协定》，让世界看到金立群行长和董事会用实际行动在践行其口号就更加重要：即亚投行虽然组织精简，但会通过其政策和实践打造一个低碳、惠民的能源未来，做到清廉、环保。

凯特·吉尔里，银行信息中心（BiC）森林项目经理

The AIIB is facing two major tests

The bank's directors will vote on a new energy sector strategy and a risky financing model

□ Kate Geary

On a small island off the coast of South Korea, the world's newest multilateral bank – the China-led Asian Infrastructure Investment Bank (AIIB) – is meeting until Sunday 18 for its second-ever annual general meeting. While the bank's first AGM in Beijing last year was mainly a back-slapping affair to celebrate its establishment, this year's AGM marks the true test of what kind of investor the AIIB will be, and what that means for the future of Asia and the world.

AIIB President Jin Liqun repeatedly says that the bank aims to be "lean, clean and green". And two decisions that the AIIB's board will take will test that aspiration to its very limits.

First, the AIIB's directors will approve the bank's new Energy Sector Strategy. In a leaked copy of that strategy seen by *chinadialogue*, the AIIB explicitly commits to the Paris Climate Agreement and the United Nations' Sustainable Development Goals. This is good news for both climate and energy access for poor communities.

However, many in civil society are worried that the strategy does not specifically stop the AIIB from financing coal. For example, 31 civil society organisations (CSOs) in India wrote to the AIIB, "We remain deeply concerned that the supposedly 'green' bank still may end up funding dirty fuels across Asia, including coal and gas thermal plants, as it does not exclude these. Other MDBs [multilateral development banks] have renounced coal funding, and the AIIB should not undermine this broader position."

Don't worry, the AIIB's head of policy and strategy Joachim von Amsberg reassured CSOs at a meeting in London, December 2016: "Don't judge us by our words but by our portfolio". In other words, we should assess the AIIB's commitment to be "lean, clean and green" not on its policies but on its investment choices.

Caught in the middle

Which brings us to the second key decision the AIIB's directors will make: whether to invest US$150 million equity in the India Infrastructure Fund. This "hands-

> The bank's policies must also be robust enough to prevent harm to people and the environment.

off" financing model, whereby a bank invests in a financial intermediary (FI) such as a commercial bank or infrastructure fund, which then on-lends to a subproject or client, is highly risky. There is growing evidence that social and environmental standards become quickly diluted and transparency is lost.

The AIIB's proposed investment in the India Infrastructure Fund will be its second intermediary investment of this kind. The first was to Indonesia's controversial Regional Infrastructure Development Fund. The AIIB already has standards relating to intermediary lending but they are not robust enough to prevent social and environmental harms or to "catch" high risk forms of lending – such as to coal.

The AIIB's peer, the International Finance Corporation (IFC), has learnt this the hard way. Over half IFCs lending is through financial intermediaries and IFC itself invested in a vehicle also called India Infrastructure Fund back in 2008. This fund backed a massive coal plant in Odisha, which led local communities to file a formal complaint to the IFC's watchdog, the CAO. Fully two thirds of the India Infrastructure Fund's current energy clients are involved in massive coal plants and mines in India. The CAO's investigation found that the IFC had breached every key environmental and social policy, including on disclosure, management of risk, due diligence and supervision.

The new head of the IFC, Philippe Le Houérou, recently recognised the high risks inherent in intermediary lending. For the first time, he pledged "we will reduce IFC's own exposure to higher risk FI activity and apply greater selectivity to these type of investments, including equity investments." The IFC also agreed to track its financial intermediary exposure to coal projects.

All this should be sounding loud alarm bells to the AIIB's Board next week. Its decision on investing in the India Infrastructure Fund is a key test of whether it can learn lessons from its peers and make the right choices.

Contrary to Mr von Amsberg's assurances, it is never going to be enough to focus only on the AIIB's investment portfolio. The bank's policies must also be robust enough to prevent harm to people and the environment. The AIIB board faces a crucial question: whether its new energy strategy, coupled with its Environmental and Social Framework, provide sufficient safeguards to "catch" high risk and high carbon sub-investments by intermediaries like the India Infrastructure Fund?

A new report published last month by India's Center for Financial Accountability and BIC Europe flags areas where AIIB's policies need tightening to close some dangerous loopholes. For instance, it should publicly disclose high-risk sub-projects; it should ensure it does not delegate all responsibility to its intermediary clients for applying its safeguards application. And it must be explicit that its Energy Sector Strategy applies across its direct and indirect lending portfolio. The report warns that as current policies stand, they are not sufficient to prevent the AIIB falling into the same traps that caught the IFC.

People matter

But another problem remains: policies are only as good as their implementation. And here is the inherent contradiction in President Jin's aspiration to be "lean, clean and green". Turning words into actions, and ensuring AIIB invests in a low carbon energy future, will require people. Not just project officers and investment managers, but experts in innovative infrastructure solutions, in social and environmental impact assessment, and perhaps most importantly, people on the ground where these projects are planned. Local context is everything. The AIIB cannot hope to figure out if it is meeting its laudable energy access goals just by measuring gigawatts generated, as it currently proposes to do. How can the bank track whether local communities that are bearing the brunt of the impacts of

its projects are also getting access to the electricity being generated?

In its first year, AIIB has co-financed 75% of its projects with other banks, such as the World Bank and Asian Development Bank. By doing this, the AIIB says it wishes to learn lessons. That may be so. But it has also simply delegated responsibility to these partners to apply social and environmental protections and manage a project's outcomes.

Already questions around this reliance on co-financiers are emerging. In Pakistan, for example, the AIIB is co-financing an extension to the Tarbela dam with the World Bank. Tens of thousands of people in the area were displaced by the previous Tarbela and Ghazi Barotha projects, and to this day, many remain without restitution for the harms they suffered. It is the World Bank that bears historic responsibility for those past projects. But the AIIB is relying on the World Bank to manage the environmental and social plans for the project. Yet as a co-financier that has committed to address past harms, the AIIB must bear equal responsibility for the project and its impacts.

Some of the AIIB's shareholder governments have expressed concern in private that the bank is running before it can walk, that the AIIB board is being asked to approve high risk projects – such as the India Infrastructure Fund or the Myingyan gas power plant in Myanmar – before it has adequate policies and systems in place.

The AIIB's public information policy is still "interim", and desperately needs revision. It is currently ranked worst of any multilateral banks. Meanwhile the bank is still in the process of establishing its accountability mechanism that is vital not only as a means of remedy for communities that have suffered harm, but also for the institution to learn from its mistakes.

This week, the AIIB will face global attention. In the wake of the US administration's withdrawal from the Paris Climate Agreement, it is more important than ever that President Jin and the AIIB board show the world the substance behind the slogans: that though it may be lean, the AIIB commits that its policies and practices will forge a low carbon and pro-poor energy future, and so be clean and green too.

Kate Geary is the forest campaign manager at the Bank Information Center.

亚投行能否助亚洲实现能源转型?

亚投行高层表示将助力亚洲国家加快能源革命，推动《巴黎协定》实施，但其颁布的《能源行业战略》显示，煤电投资之门并未关死。

□ 刘 琴　姚 喆

总部设在北京的亚洲基础设施投资银行 (亚投行) 将第二届年会选在韩国的济州岛召开，该岛是韩国正在打造中的“零碳”旅游地。年会地点的选择呼应着亚投行营造“清洁”发展银行形象的努力，而最能检验这一努力成色的也许就是在这次年会上颁布的《能源行业战略》了。

能源项目的投资规模大，运营时间长，对地区碳排放的影响不仅巨大而且长远，因而选择投资何种能源项目对于投资银行的环境表现也影响巨大。而加上本次年会上新批准的 3 个项目，亚投行16个已经获批的项目中，能源项目就占了 7 个。

力挺《巴黎协定》

和习近平此前对《巴黎协定》的坚定支持一致，亚投行行长金立群在6月16日举行的第二届年会开幕式上明确表示，亚投行对于推动实现《巴黎协定》，特别是帮助成员国实现低碳转型，具有重要作用。他特别举出一个孟加拉国的电网建设项目为例，指出该项目在为1200万农村居民提供廉价电力的同时，还能减少1万6千多吨二氧化碳排放。

创绿研究院（Greenovation Hub）研究员白韫雯告诉中外对话，《能源行业战略》在提及如何遵循《巴黎协定》方面的确比之前的草稿有了细化，提到“亚投行能源项目要遵循各国能源投资战略，而且要基于其《巴黎协定》下提交的国家自助贡献方案（NDC）”，这意味着AIIB确定投资前，需要审慎考量投资项目可能带来碳排放效应，以及是否有助帮助投资所在国实现其应对气候变化设定的目标，例如包括地区碳强度的降低、可再生能源比重的提升等。

而牛津大学可持续金融项目总监本·考尔德考特（Ben Caldecott）也认为这份战略显示出亚投行认识到了自身有机会对巴黎气候协定的实施做出贡献，并且有能力在亚洲的清洁能源革命中扮演重要角色。

乐施会发言人梅家永告诉中外对话，亚投行承诺推动《巴黎协定》和联合国可持续发展目标 , 这是一个充满希望的开始。亚投行可以向成员国提供实现可再生能源目标的资金，并推动全球南方国家成为新兴气候领导的趋势。

煤电政策争议

但这份号称要帮助成员国实现低碳转型的战略文件无法让长久以来关注亚投行的民间组织放下担忧，因为草稿中“有条件的”投资煤电的表达在终稿中依然得以保留。煤电在亚洲的扩张带来的环境和公众健康代价正日益成为关注焦点，因此亚投行对煤电的态度受到高度关注。

创绿研究院（Greenovation Hub）研究员白韫雯告诉中外对话，和二稿相比，对于煤电投资的文字部分没有变化，即低碳排放的燃油和燃煤电厂在以下 3 种情况有望得到支持：项目将取代现有的更低效

的产能；项目对完善电力系统建设并提升其可靠性是不可或缺的；该地区不存在可行的或经济上可负担的替代方案，特别是在低收入国家。

牛津大学的考尔德考特认为对煤电网开一面是个错误。除了空气污染带来的健康危害，煤电还面临着资产搁浅的风险，以及将项目区域长期锁定在昂贵的化石能源基础设施中的问题。

白韫雯指出，亚投行总体上对煤电持排斥态度，但也给自己留出未来可能投资的空间，因此在对具体煤电类项目做决定时“缺少清晰的界定及明确的政策指导”。

银行观察（Bankwatch）的王娃娃（音）表示，以亚投行目前的能源战略和投资组合，不清楚它如何帮助各国达成巴黎协定目标。

她认为在煤电问题上，亚投行《能源行业战略》与其他多边金融机构存在差距：“其他国际金融机构已经退出了煤电项目。如亚洲开发银行（Asian Development Bank）自2013年以来还未资助过一个燃煤电厂项目；欧洲投资银行（European Investment Bank）也远离了煤电项目，制定了严格的排放绩效标准。去年，世界银行的行长将东南亚的燃煤电站项目称为‘这个星球的灾难’。”王娃娃（音）说，“亚投行却还认为‘可考虑碳效率高的燃煤电厂’。”

“看到这份能源战略真的很失望，8个月的沟通最后还是回到原点，支持煤电这类化石能源还是留在了文本中，”她担心随着煤炭行业既得利益集团的持续活动，亚投行是否能坚守其推动“廉洁、绿色”基础设施建设所面临的考验。

乐施会的梅家永更是直接指出，煤炭行业已经行动起来，对亚投行进行游说。

对于这些质疑，亚投行高层强调应该以其实际投资组合的表现为衡量标准。“到现在为止，我们没有投资过煤电，也没有正在计划投资中的煤电项目，只要对其环境影响有所担忧，我们就不会投资这类项目。”金立群在年会开幕发言中特别指出。

加上本次年会上新批准的3个项目，目前亚投行的16个获得正式批准的投资项目中的确不包含煤电，能源类的7个项目涵盖了水电、燃气发电、油气管网和电网建设。

精简还是粗略？

除了“廉洁、绿色”，亚投行的另一个口号“精简”似乎也受到了考验。据财新报道，亚投行与世行、亚行等传统发展机构相比，最大的例外之一是没有常驻董事会。仅这一项每年大概可省去亚投行7000万美元的资金。

但也有一些民间组织担心亚投行的“精简”可能表现为投资管理上的“粗略”。以《能源行业战略》为例，白韫雯介绍，亚投行只是笼统的说要低碳转型，却没有给出目标实现的路线图和阶段性陈述，各种能源类型没有量化的指标，也没有说明该文本实施的有效期。而其他多边银行，如世界银行、亚行，在大的战略之下还有具体的政策来配套。世界自然基金会中国代表处（WWF China）就建议亚投行设定可再生能源的年度投资额或每年增长率等绝对或相对的量化目标，比如每年至少投入50亿美元在风电和太阳能等可再生能源项目中，或使可再生能源至少占50%的新增发电装机容量。

此外，与其他老牌多边发展银行相比，亚投行的另一特点是所投资的项目大部分都是与其他银行共同融资。行长金立群表示，亚投行与其他银行不是竞争的关系，而是建立起良好的合作关系。但银行信息中心（BIC）的凯特·吉尔里 (Kate Geary) 认为，这样一来，亚投行也可能把保护社会与环境、管理项目成果的责任推给了搭档。

吉尔里指出，一些成员国已经私下表达了自己的担忧，认为亚投行有些操之过急，相关政策和体系还没完善到位，董事会就被要求批准印度基础设施投资基金、缅甸敏健天然气发电厂这样的高风险项目。本次年会上，印度基础设施投资基金项目已经获得通过，吉尔里认为这种与金融中介合作的模式可能导致投资银行对项目的环境足迹失去控制。而亚投行的公共信息政策和问责机制两项关键的保障措施仍处于建设完善中。

对于刚刚成立不到一年半的亚投行，边做边学，在工作中完善制度的过程似乎还将继续下去，而围绕着它的种种争议也将继续。特别是在国际气候行动前景变得有些不确定的当下，承诺不在环境上妥协的亚投行接下来的每一个能源投资项目，都将受到高度关注。

刘琴，中外对话研究员

姚喆，中外对话气候战略传播项目官员

Can the AIIB support Asia's energy revolution?

The bank will help countries meet the Paris Agreement but its energy strategy still leaves the door open to coal

□ Liu Qin　Yao Zhe

AIIB president Jin Liqun speaking at the 2nd annual meeting of the Asian Infrastructure Investment Bank

The Asian Infrastructure Investment Bank (AIIB), headquartered in Beijing, held its second annual meeting on the Korean island of Jeju last week. Korea is currently positioning Jeju as a zero-carbon tourist destination so the choice of location must have seemed appropriate for a bank that is looking to promote a "clean" image. But the real test will be how the bank acts on its Energy Sector Strategy, which was revealed at the meeting.

Energy projects require large investments, operate for decades, and can have significant and long-lasting impacts

on regional carbon emissions. This means that decisions over which energy projects get funded have important implications for the bank's environmental performance and that of host countries.

Backing Paris

Echoing Xi Jinping's firm support for the Paris Agreement, AIIB chief Jin Liqun, speaking at the opening of the bank's annual meeting on June 16, made clear that the AIIB has an important role to play in helping countries fulfil the Paris Agreement. He singled out an electricity grid project in Bangladesh as an example of the AIIB helping 12 million rural residents to access cheap electricity, all while avoiding 16,000 tonnes of CO_2 emissions.

The bank's energy strategy provides some detail on how its investments will respect the Paris Agreement: "Bank support to countries will be aligned with their national energy investment plans/strategies, including their NDCs [Nationally Determined Contributions] under the Paris Agreement."

This means that prior to making investments, the AIIB will consider the potential impacts on carbon emissions, and whether proposed projects will help the host nations achieve their climate change targets. This includes, for example, lowering regional carbon intensity and increasing the proportion of renewables in the energy mix.

Ben Caldecott, director of the Sustainable Finance Programme at the University of Oxford Smith School of Enterprise and the Environment commented that: "The AIIB can play an important role in accelerating the clean energy revolution in Asia and it is significant that it now recognises this opportunity to contribute to both sustainable development and the implementation of the Paris climate change agreement."

> "Other multilateral banks, such as the World Bank and the Asian Development Bank, have more specific policies that add substance to their overarching strategies."

Oxfam spokesperson Mei Jiayong told chinadialogue that the AIIB has committed to promote both the Paris Agreement and the UN's sustainable development goals, which is a good start. The AIIB can provide member nations with the funding to achieve renewable energy goals and continue the trend of southern nations emerging as climate leaders.

Controversy over coal policy

But the new energy sector strategy has not laid to rest concerns by NGOs because the language on investments in coal power under certain circumstances was retained in the final document. Concern over the environmental and health consequences of expanding coal power in Asia is growing, and so the AIIB's stance on the sector has been closely watched.

Bai Yunwen, a researcher with Greenovation Hub, told *chinadialogue* that there had been no change in the language on coal power between the second and final drafts, and carbon efficient coal and natural gas projects could be funded in three circumstances: the replacement of less efficient capacity; when essential for reliability and integrity of the system; and when there is no viable or affordable alternative.

Ben Caldecott warned that "it is an error to leave the door open to the AIIB supporting new coal investments. These face significant stranded asset risks, harm human health by contributing to air pollution, and lock-in expensive fossil fuel infrastructure for longer than necessary."

Bai Yunwen pointed out that overall the AIIB wants to avoid funding coal but has left itself scope to do so in future. And so there is a "lack of clear definitions and policy guidance," for decision-making on coal power projects.

Wang Wawa of Bankwatch said that given the AIIB's energy strategy and existing investments, it is unclear how it will help members reach their Paris Agreement goals.

She said there is a gap between the AIIB's energy strategy and the approach of other multilateral banks on coal power. "Other international financial bodies have withdrawn from

coal power. The Asian Development Bank hasn't funded a single coal power project since 2013; the European Investment Bank no longer has anything to do with coal power and has put strict emissions efficiency standards in place. Last year the president of the World Bank described coal power in Southeast Asia as 'a disaster for the planet', yet the AIIB still says 'carbon efficient oil- and coal-fired power plants would be considered'".

Wang Wawa worries that sustained lobbying by the coal industry may test the AIIB's resolve to promote "clean and green" infrastructure construction. "We were very disappointed to see this document. Eight months of consultations and we're back where we started, with language supporting fossil fuels such as coal."

Mei Jiayong pointed out that the coal industry is already at work lobbying the AIIB.

The AIIB's leadership has responded by stressing it should be judged by the overall body of its investments. In his opening speech at the annual meeting, Jin Liqun said: "So far we haven't invested in coal power, nor do we have any current plans to do so. If there are any concerns over environmental impact, we will not invest in such projects."

With three new projects given the go-ahead at the annual meeting, the AIIB has officially approved 16 investments – none of which involve coal power. The seven energy-sector investments made to date include hydropower, natural gas, and gas and power networks.

Lean or crude?

Alongside being "clean and green" the AIIB claims to be "lean". But this claim is also being put to the test. According to a Caixin report, one of the biggest differences between the AIIB and other development banks such as the Asian Development Bank and the World Bank is the lack of a resident board of directors. This is expected to save the AIIB approximately US$70 million a year.

But some NGOs are worried the bank's efforts to be "lean" may lead to "sloppiness" in the way investments are managed. Bai Yunwen points out that in the energy strategy the bank only refers to low-carbon transitions in general; there are no roadmaps to achieve targets or staged goals, no quantified aims for the various forms of energy, or when the document will come in to effect.

Other multilateral banks, such as the World Bank and the Asian Development Bank, have more specific policies that add substance to their overarching strategies. WWF China has suggested relative or absolute targets are set, such as for total annual investment, or annual rate of growth of investment. For example, in renewables it suggests the AIIB invest at least US$5 billion a year in wind and solar power, or to have renewables account for at least 50% of new electricity capacity funded by the bank.

Again, unlike the more established multilateral banks, the AIIB's projects are mostly jointly-funded with other banks. Jin Liqun indicated the AIIB doesn't see other banks as competitors, but as partners. But Kate Geary of the Bank Information Centre says this may lead the bank to pass responsibility for the management of projects and the social and environmental outcomes onto its partners.

Geary pointed out that some bank members have already raised concerns in private that the bank is being too hasty, with the board of directors asked to approve high-risk projects such as the India Infrastructure Fund and the Myingyang Power Plant in Myanmar before the appropriate policies and systems are in place.

Investment in the India Infrastructure Fund was approved at the recent annual meeting, but Geary warns working through financial agencies in this way may lead to the bank losing control of the environmental footprint of its projects.

Meanwhile two key safeguarding measures, the bank's complaints handling mechanism and public information policy are still being finalised.

The AIIB has existed for less than 18 months and will continue developing its systems. But the controversy surrounding what it invests in looks likely to continue, too. The AIIB has promised not to compromise on the environment, meaning every energy project it takes on will be closely watched.

Liu Qin is a researcher at chinadialogue.

Yao Zhe is a strategic climate communications officer at chinadialogue.

中拉经济合作：谈钱不简单

中国企业需要善用市场化手段降低对拉美贷款和投资的风险，拉美国家则需善用外资来塑造健康的发展模式。

□ 张 春

位于巴西的石油平台。在当前经济环境和存在偿还风险的情况下，中国仍持续向拉美国家发放贷款

尽管规模较前两年有所降低，2016 年中国继续对委内瑞拉进行着大规模借贷，当年 11 月中国向委内瑞拉提供了 22 亿美元贷款。到 2015 年底，中国向委内瑞拉的贷款总额已经达到 530 亿美元。泛美对话则认为这一金额高达 650 亿美元。

委内瑞拉总统马杜罗在一次电视讲话中感谢了中国：“非常感谢贵国过去三年的支持，特别是 2016 年。我们的兄弟没有在危难时刻抛弃委内瑞拉。”

然而在全球经济环境正在发生深刻变化的当下，对中国而言，持续向拉美国家贷款并非没有隐忧。据泛美对话的统计，中国 2016 年对拉美贷款 92% 流入了厄瓜多尔、委内瑞拉和巴西。而按照世界银行的统计，这三个国家今年的经济走势都不好：巴西 2011 年以后一直经济下滑，委内瑞拉经济更是持续恶化，而厄瓜多尔也在 2015 年结束了连续 15 年的经济增长。

专家指出，中拉经济合作面临着来自两个方向的挑战：拉丁美洲国家如何更好地利用中国投资实现可持续发展，以及中国政府和企业如何更好地做出投资决策。

穿越半个地球的石油贷款

以委内瑞拉为例，该国目前实业生产几近停滞，国家信用评级全球垫底，已经无法按期偿还约 190 亿美元来自中国的贷款。

中国社会科学院拉丁美洲研究所资深研究员吴国平认为，委内瑞拉的经济困难与其石油生产的内在局限有关。

委内瑞拉石油储量世界第一，但当前产量还不及沙特阿拉伯的五分之一，这是由于其油质过重，开采和提炼的成本都较高。“委内瑞拉的石油每桶要卖到 60 美元，才可能盈利，”吴国平说。但全球石油价格自 2014 年 11 月跌破 60 美元大关，至今也未能恢复。

这对委内瑞拉以石油偿还外国贷款造成了额外负担，由于石油换贷款合同在油价高位时商定，油价下跌导致委国需出口比预期更多的石油才能偿还贷款。据路透社报道，2016 年委内瑞拉对华对俄的石油运输有所拖欠，其中，委国营石油公司 PDVSA 对中国和俄罗斯拖欠了价值共约 7.5 亿美元的的石油。

除了贷款坏账问题和炼制难度（中国需要修建专门炼油厂提炼来自委内瑞拉的重质石油），委内瑞拉石油要飘洋过海穿越半个地球才能抵达中国。吴国平认为，这样中国使用委内瑞拉石油的成本就太高了。

从输血到造血

对拉丁美洲自身而言，怎么用好来自中国的贷款也至关重要。“中国的钱不会自动促成一个可持续的社会的建设，只有拉美自己做好打算，这些钱才会被引到对拉美真正有用的途径上。”波士顿大学拉美研究教授凯文 · 加拉格说。

这是一块拥有丰富的资源，却总以资源形式出口的大陆。中方银行的贷款也主要投向了能源矿产和基建领域。加拉格表示，拉美国家现在拿到中国的钱，主要想的还是修建通往连接矿区、冶炼厂和港口的基础设施，与真正的经济一体化和可持续发展相去甚远。

加拉格在他的新书《The China Triangle》中分析说，拉美很多国家因为资源优势导致了出口结构失衡，为了加强维持出口优势，出口收益又被用在资源相关领域的再投资，而能够支撑社会经济可持续发展的产业和领域没有得到应有的扶持。

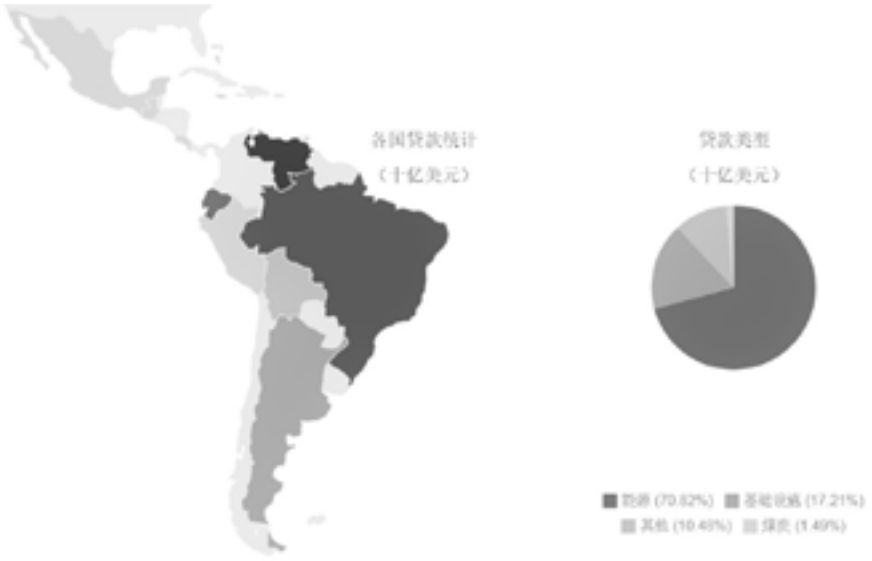
吴国平则认为，拉美国家的国内政治格局也是一大因素。以委内瑞拉为例，由于石油此前带来的高收益，“左翼”执政党为了留住选民实施了具有民粹主义倾向的高福利政策。查韦斯政府实行了全民免费教育和免费医保，并且不定期向穷人发放补贴。但如高速公路等看上去并不直接增加民众福利的社会基础设施建设，大多未能在经济增长的高峰期内得到改善。

另外，他还认为中国经济转型导致其国内需求结构变化，这也意味着对华出口国的出口结构发生变化。对拉美而言，这是产业升级的机遇也是发展的挑战。

加拉格也告诉中外对话，中国若转型顺利，可能就不再需要拉美现在能提供的大宗商品。

截至 2013 年，拉美和加勒比海地区对华出口额已占到其总出口额的 9%，其中农业和采掘业达到行业出口总额的 15%。

中国政策性银行对拉美贷款



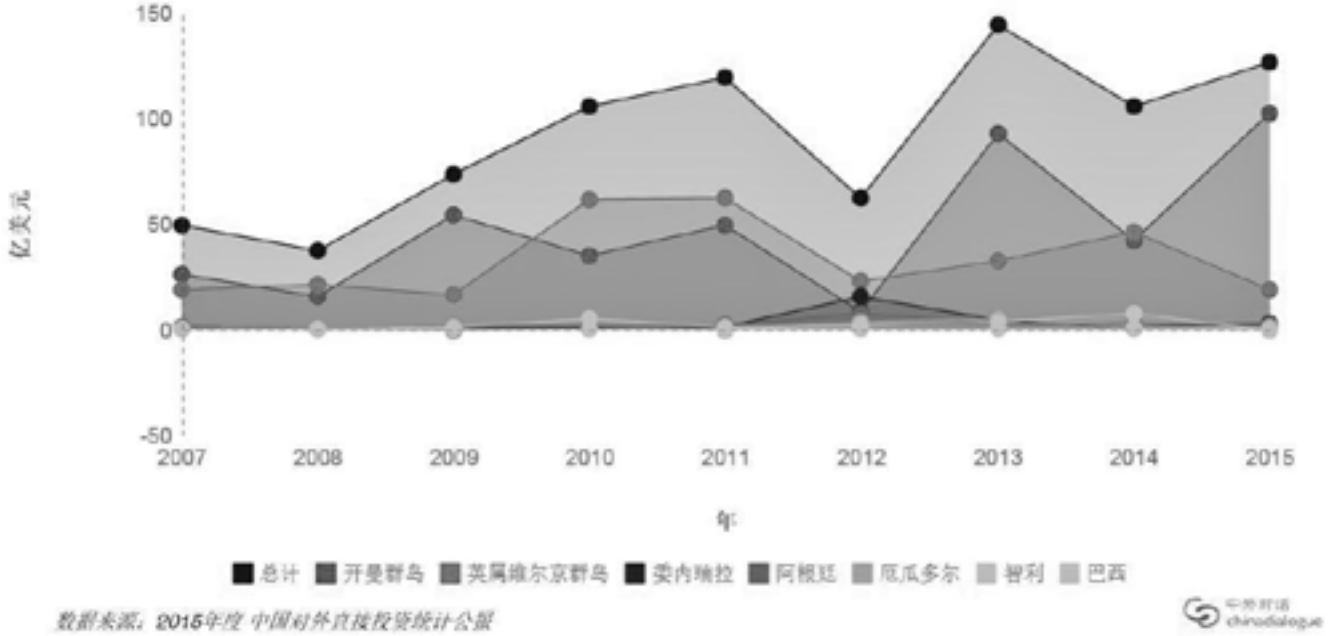
2005–2016年，中国对拉丁美洲政策贷款总额。数据来源：泛美对话

对拉投资：在商言商

目前中国流向拉美的资金，政策性贷款远大于直接投资。自 2005 年以来，中国对拉美的贷款已经超过 1400 亿美元，是拉美最大的债主。但若论直接投资，目前中国每年直接投资还不足拉美接收的总投资的十分之一，其中大约 90% 又流向了开曼群岛和英属维尔京群岛这两个离岸金融中心。

尽管投资规模不大，但功课做不到家还是可能给中国投资者带来麻烦。例如，商务部下属的中国中东贸易促进中心（Chinamax）与墨西

中国对拉美直接投资



数据来源：2015年度 中国对外直接投资统计公报

哥合作投资的龙城商贸集散中心，在接近完成时因砍伐了受保护的树木而被叫停。

墨西哥国立自治大学教授恩里克·杜塞尔·彼得斯告诉媒体，中国不论国营还是私营公司对墨西哥都不够了解，在龙城项目中，中方的墨西哥同行也没有向他们详细解释墨西哥的法律和制度，最终造成项目因为未达到环保标准而停止。

专门从事海外投资方向业务的李治国律师也曾告诉中外对话，中国企业获取资源的目的性太强，又对当地法律制度认知不够，没有成熟的“商业文化”，这些都是可能导致其投资失败的原因。

吴国平认为至少有两个因素容易造成中国企业在投资国引起的争议，以及在国际媒体中的相对负面的形象。第一，中国企业主投的领域主要集中在资源矿产类项目上，容易对环境产生一定的影响；第二，资源型投资主要是由大型国有企业承担，并且主要投向国家主导型的经济体，难以完全适应市场竞争的游戏规则。

吴国平建议中国企业应该在市场竞争中不断提高其竞争力，对项目投资回报率如何、通过什么方式收回成本，多做功课。尤其是在拉美国家的基础设施投资项目中，要深入研究拉美自身的基础设施建设和管理等运行的特点，力争实现投资项目的经济和社会的双重效益。

不论国企还是民企，要提高在拉美市场的投资成功率，不仅要更多地了解拉美，更应当了解并遵循当地市场的规律和游戏规则。吴国平认为，随着中国海外投资规模的扩大，越来越多的民营企业也开始拓展海外业务，这些企业的涌入有利于提高和完善中国企业在拉美的市场竞争力，逐渐建立起一个相对平衡的市场对话机制，让中国企业赢得市场尊重，也可以通过市场规则和次序规避不必要的投资风险。

张春，中外对话高级研究员

Latin America oil states struggling to pay Chinese debts

The global oil crisis has forced Latin America and China to re-examine their terms of trade

□ Zhang Chun

As Chinese loans pour into Latin America, concerns over how the money is spent and how it will be repaid are growing on both sides of the bargaining table.

Of most immediate concern for China is whether economically unstable governments such as Venezuela can pay back multi-billion dollar loans amid globally low prices for crude oil.

By the close of 2015, China held US$53 billion of Venezuelan debt. However, US think tank Inter-American Dialogue suggests it could be as much as US$65 billion. Despite Venezuela's deepening recession, China has continued to lend, with US$2.2 billion in November 2016 alone.

"Many thanks for all the support you have given Venezuela in 2014, 2015, and especially 2016. Our older sister China has not left Venezuela alone in moments of difficulty," said Venezuelan President Nicolás Maduro in a televised speech.

But the changing global economic environment means that China cannot continue lending to Latin American countries worry-free. Analysis by Inter-American Dialogue shows that in 2016, 92% of China's loans to Latin America went to Ecuador, Venezuela and Brazil, nations which are all facing serious economic challenges according to the World Bank.

The Brazilian economy has been shrinking since 2011, while the economy in Venezuela also continues to deteriorate. In 2015, 15 years of sustained economic growth came to an end in Ecuador.

Experts say the main challenge facing economic cooperation between China and Latin America is whether Chinese investment could better promote sustainable development that is less risky and more environmentally responsible.

> "The country's economic growth has all but ground to a halt leaving its credit rating in tatters."

Oil loans around the globe

Take Venezuela as an example. The country's economic growth has all but ground to a halt leaving its credit rating in tatters. It is already unable to repay the US$19 billion in loans that it owes to China, according to Barclays Capital Inc.

Wu Guoping, a senior researcher at the Institute of Latin American Studies, part of the Chinese Academy of Social Sciences, says that Venezuela's economic difficulties are linked with the inherent limitations of its oil sector.

Venezuela has the world's largest oil reserves but produces less than 20% of Saudi Arabia's output because its oil is heavier and so more expensive to extract and refine.

"It's only profitable if the price of oil is at US$60 or higher," says Wu. But that price hasn't been seen since November 2014.

Venezuela repays its loans to China with oil to the equivalent value. Many oil-for-loans contracts were signed when the price of oil was high but now the country is under pressure to supply much larger quantities than earlier expected.

According to Reuters, Venezuela started to fall behind with oil shipments to China and Russia in 2016, with the national oil company Petróleos de Venezuela failing to supply oil worth US$750 million that year.

As well as missed shipments and refining difficulties (China had to build a new refinery specifically for the heavier Venezuelan oil), it has to be shipped halfway around the world to reach China. Taken together, Wu thinks this is too costly an option for China.

From exports to self-sufficiency

For Latin American countries, including Venezuela, the crucial question is how to use Chinese loans.

"China can't be the one to trigger sustainability but if Latin America got its act together the Chinese could provide some real funding," says Kevin Gallagher, a professor at Boston University who studies the region.

Latin America is rich in natural resources but these are exported as raw materials rather than as processed products. Loans from Chinese banks are focused on energy, mining and infrastructure.

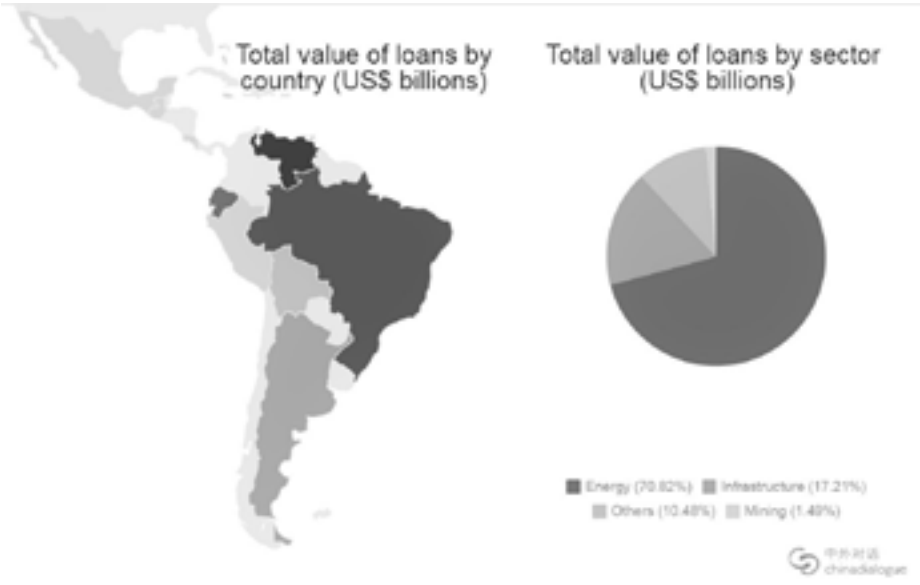
According to Gallagher, Latin American governments mainly use Chinese loans to build infrastructure between mines and oil fields to refineries and ports, a far cry from real economic integration or sustainable development.

In Gallagher's new book, The China Triangle, he says that the situation in many Latin American nations has led to a trade imbalance where countries rely heavily on exports. Profits made from the export of natural resources are reinvested into the extractive sector rather than into sustainable economic and social development.

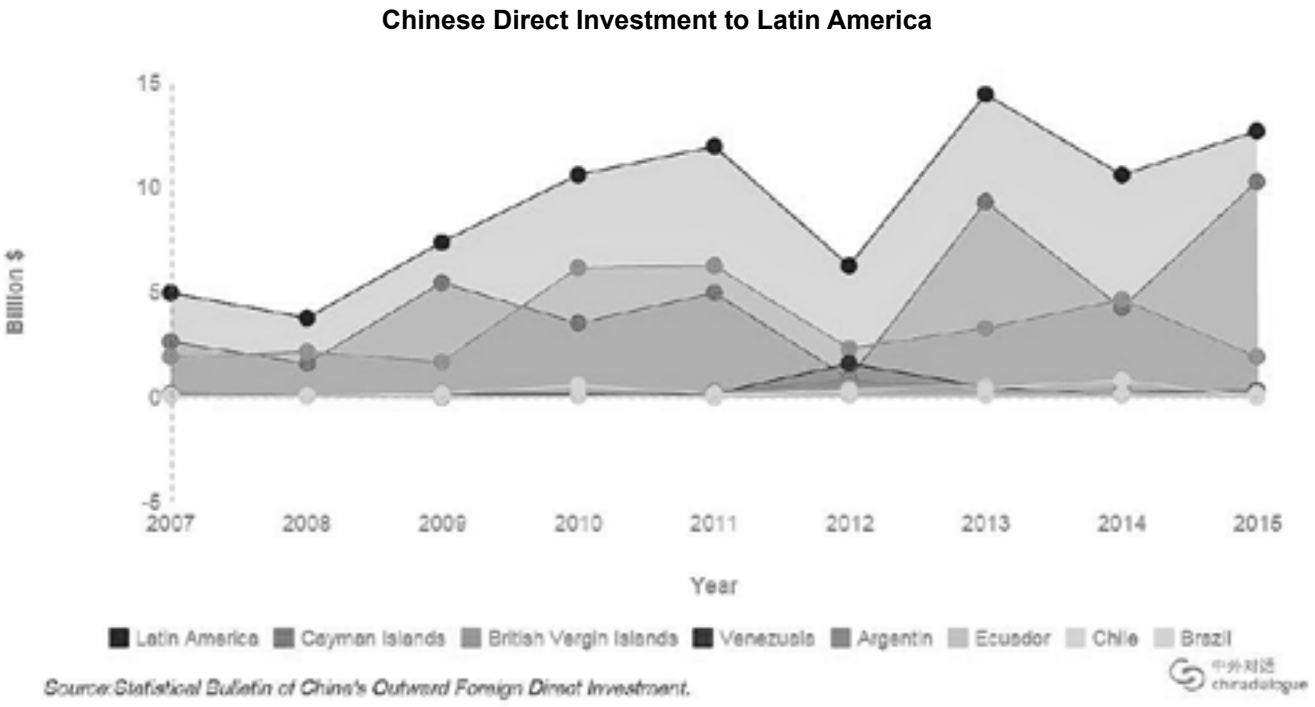
Domestic politics is a major factor in shaping the investment choices of Latin American governments.

In Venezuela the "Leftist" governing party used the profits

Loans from China's policy banks to Latin America



Source:www.thedialogue.org/map_list



Data from the 2015 Chinese Direct Overseas Investment Statistics Bulletin.

from the oil sector to fund populist welfare policies. The Hugo Chavez administration offered free education and healthcare and issued occasional payments to the poor, while infrastructure that has a less visible impact on public welfare such as expressways was neglected.

Wu thinks that China's economic transition is changing the structure of its domestic imports. For Latin America this is both an opportunity to improve its industries and a challenge.

Gallagher also told *chinadialogue* that if China's economic transition goes smoothly, China will need fewer commodities from Latin America. For example, if renewables take a greater market share then China would potentially have less need for oil imports.

In 2013, 9% of exports from Latin America and the Caribbean went to China, including 15% of the region's exports from agriculture and the extractive industries.

The bulk of the money flowing from China to Latin America is in the form of policy loans rather than direct investment.

China has lent over US$140 billion to Latin America since 2005 and is the region's biggest creditor. But China accounts for less than 10% of direct investment in Latin America, and 90% of that goes to two offshore financial centres, the Cayman Islands and the British Virgin Island

Investment challenges

Despite the small quantities of direct investment, a failure to adequately research local regulations has still caused problems for Chinese investors. For example, Chinamex, a Ministry of Commerce agency promoting Chinese investment in the Middle East, invested in Dragon Mart Cancun, a retail and residential development in Mexico. But the project was halted just before completion due to the felling of protected trees.

Enrique Dussel Peters, a professor at the National Autonomous University of Mexico, has said that Chinese firms, whether state-owned or private, do not have an adequate understanding of the region, and that in the Dragon Mart project the Chinese firm's local partner had failed to explain Mexican laws and systems.

Li Zhiguo, a lawyer specialising in overseas investment, told *chinadialogue* that Chinese state-owned firms are too

fixated on obtaining raw materials rather than understanding local legal environments, and that they lack a mature "corporate culture." Any of these factors can cause an investment to fail.

Wu Guoping thinks there are at least two factors that cause Chinese firms reputational damage when investing abroad.

First, Chinese companies mainly invest in resources and mining, where there is a higher risk of environmental impacts. Second, investments are mostly undertaken by large state-owned enterprises, which receive support from China's "policy banks" and have a huge advantage compared with private banks. Government support means they struggle to be competitive in the market.

Wu thinks Chinese firms need to address this competitive weakness and give greater consideration to the rate of return on project investments, particularly when investing in infrastructure in Latin America.

Wu says that as China's overseas investments expand, the competitiveness of Chinese firms in Latin American markets will increase. This will improve the reputation of Chinese firms as informed financial market players and help to avoid unnecessary investment risks.

Zhang Chun is a senior researcher at chinadialogue.

中国对拉投资结构转变，第三产业异军突起

研究报告显示，中国在拉美地区投资不再为资源行业垄断，金融、可再生能源、汽车等行业都有机会吸纳大量中资。

□ 肖恩·迈纳

中国对拉美国家直接投资已超过1100亿美元，并且继续保持着高速增长的势头。实际上，就每年在巴西等国的外商直接投资额来说，中国已经与美国或西班牙不相上下。

因为数据匮乏，此前中国对拉美国家投资趋势始终令人难以把握。在最新的大西洋理事会—经合组织发展中心报告——《中国对拉直接投资：具有国际影响的新趋势》中，我们对此进行了探讨。过去5年，中国企业对该地区的年均投资额超过100亿美元。在继贸易、贷款之后，投资成为中国与拉美地区合作的又一热点。

2015年1月，习近平在北京召开的中国－拉美和加勒比国家共同体论坛首届部长级会议（CELAC）上表示，到2025年，中国企业对拉美国家投资额将达2500亿美元。我们的报告显示，目前中国对拉投资额已接近这一目标的一半。拉动中国对拉投资增长的主要因素有以下几个方面：中国政府的“走出去”战略持续鼓励本国企业去海外投资；拉美地区重新成为中国关注的重点地区，例如去年11月中国发布的《中国对拉美和加勒比政策文件》中还制定了与该地区进行合作的策略；中国企业已经注意到拉美地区的投资机遇，并且积累了更多与这一地区打交道的经验。

> “鉴于拉美国家在绿色能源领域的进取态度，以及中国对该领域日渐浓厚的兴趣和增长需求，绿色能源领域还将迎来更多的中方投资。中拉应组成一个绿色联盟，在这些领域共同开创未来 。”

除了投资额的快速增长之外，我们的报告显示，中国在拉投资的性质也在发生着改变。2013年以来，服务行业吸纳的投资占投资总额的一半以上。实际上，金融、电力、可再生能源、交通等行业共吸纳了超过40亿美元的中国投资。与之前石油、天然气、矿产金属等资本密集度高、就业率低的经济领域占投资的绝大部分相比，这是一个重大的变化趋势。

中国在拉可再生能源领域投资快速增长是一个重要的方面。2013年以来，该行业吸纳的投资超过60亿美元，其中大部分来自中国长江三峡集团公司。风能和太阳能领域也能看到中资的身影。

鉴于拉美国家在绿色能源领域的进取态度，以及中国对该领域日渐浓厚的兴趣和增长需求，绿色能源领域还将迎来更多的中方投资。从太阳能电池板组装，到建设风力发电厂和水电大坝，中拉应组成一个绿色联盟，在这些领域共同开创未来 。

此外，由于中国企业急于扩大在美洲地区汽车市场的份额，拉美地区的汽车行业也吸引了超过 100 亿美元的投资。但是，这些投资主要集中在巴西、墨西哥和阿根廷。这一点与中国在拉投资的整体流向不谋而合，都是流入了巴西、秘鲁、墨西哥、阿根廷、玻利维亚等少数几个国家。还值得注意的是，中国对拉投资的绝大部分来自于国有企业，占投资总额的 80%。这一点与中国对欧美地区投资主要来自中国私营企业完全不同。

拉美各国政府欢迎中国投资。墨西哥不仅鼓励中方投资汽车行业，还与中方签订了石油天然气开采合同。巴西力邀中方投资其电力行业，并如愿以偿地获得了中方 90 亿美元的投资，其中大部分来自中国国家电网，包括购买水电大坝和输电线路。

这些投资项目中并购所占比例逐渐增加。这说明拉美企业对中国企业的吸引力在逐渐增强。中资银行尤为活跃，收购或投资了超过 20 家拉美地区的金融机构，包括巴西百达投资银行、巴西 BBM 银行、巴西工商银行、以及标准银行等。

中国在采掘业的投资额依然巨大。因此，拉美地区的政府应强化环境法规，加大对违法行为的追查力度，完善监管机制。毕竟，确保投资项目的环保和可持续是他们无可推卸的责任。

肖恩·迈纳，阿德里安·阿尔斯特拉丁美洲中心拉丁美洲倡议项目中国组研究员兼副主任

Chinese investors zero-in on Latin America

President Xi plans to invest US$250 billion by 2025 but which sectors stand to win or lose?

□ Sean Miner

Chinese foreign direct investment in Latin America has now surpassed US$110 billion (743 billion yuan) and continues to rise fast. In fact, annual flows of Chinese FDI to countries such as Brazil now rival those from the United States or Spain.

In our new Atlantic Council – OECD Development Centre report, Chinese FDI in Latin America: New Trends with Global Implications, we shine a light on an area that was previously hard to understand because of unclear data. Annual investment flows by Chinese firms to the region have averaged over US$10 billion over the previous five years. This new reality completes an economic trifecta, establishing China as a major partner for trade, lending, and now, investment for Latin America.

In a speech to the leaders of the Community of Latin American and Caribbean States (CELAC) in Beijing in January 2015, Chinese President Xi Jinping said Chinese companies will invest US$250 billion by 2025. Our report shows they are almost halfway there. Several factors explain this: the government is encouraging Chinese firms to invest abroad through its "going out" strategy; the country has renewed its focus on Latin America, as evidenced by a 2016 policy paper laying out a strategy for engaging with the region; and Chinese companies have awakened to the investment opportunities Latin America has to offer, and are more experienced in the region.

Alongside the rapid rise in investment, the nature of Chinese investment in Latin America is changing as well,

> "Brazil has encouraged Chinese investment in the electricity industry, and has been duly rewarded with nearly US$9 billion."

with the service sector receiving over half of all investment since 2013. In fact, industries such as finance, electricity, renewable energy, and transport have all received more than US$4 billion in Chinese investment. This is an important rebalancing from a focus on capital intensive but low employment areas of the economy such as oil and gas, mining and metals.

The sharp rise in Chinese investment in renewable energy is particularly interesting. The sector has received over US$6 billion since 2013, with China's Three Gorges Corp leading the way. Wind and solar have also attracted an increasing amount of investment.

Given Latin America's leadership on green energy, and China's growing attention and need for it, there is plenty of scope for further investment. From factories that assemble solar panels to the creation of wind farms and hydro dams, Latin America and China should form a "green" working group to collaborate on shaping the future of these industries.

Elsewhere, Latin America's automotive industry has received over US$10 billion in investment, as Chinese firms race to capture market share in the Americas. However, these investments are concentrated in Brazil, Mexico, and Argentina. This is consistent with overall Chinese investment in Latin America, focused in a just few countries, including Brazil, Peru, Mexico, Argentina, and Bolivia. Also notable is that the vast majority of Chinese investment is from state-owned enterprises (SOEs), comprising over 80%, contrary to Chinese FDI in the US and EU, which come from mainly private Chinese firms.

Governments across Latin America are welcoming Chinese investment. Mexico has facilitated this in the auto industry, as well as signing new oil and gas exploration contracts. Brazil has encouraged Chinese investment in the electricity industry, and has been duly rewarded with nearly US$9 billion, mainly from the State Grid Corp of China. This includes purchases of hydropower dams and transmission lines.

A growing portion of these investments are mergers and acquisitions, showing Chinese firms are finding partnerships with Latin American companies increasingly attractive. Chinese banks have been especially active, acquiring or investing in over 20 financial firms in Latin America, including: BTG Pactual, Banco BBM, BicBanco, and Standard Bank.

Chinese investment in the extractive sector remains large, so governments in Latin America should strengthen their environmental laws and increase accountability for compliance, with stronger monitoring mechanisms. It's ultimately their responsibility to ensure investments are sustainable and environmentally friendly.

Sean Miner is a fellow and associate director of the China – Latin America Initiative in the Adrienne Arsht Latin America Center.

中资企业为何看上巴西煤炭市场?

在国内削减煤炭消费的大背景下，中资企业在市场远小于中国的巴西增持煤炭资产是否明智？

□ 米尔顿·莱亚尔

中国正进一步落实政策，削减煤炭消费，增加可再生能源发电。而与此同时，中资银行和煤电项目承建企业却把目光投向巴西等其他国家，试图在那里发展能源项目。

“2013 年以来，中国国家开发银行的境外煤炭项目投资增长了 40%。”波士顿大学全球发展学教授凯文·加拉格尔说。他还说：“纵观中国的海外煤炭投资史，其中 75% 发生在最近 4 年间，全球煤炭部门 8% 的外部融资来自中国。”

巴西拥有 22 座燃煤热电厂，总装机 370 万千瓦，占巴西总装机容量的 2.3%。位于巴西南部圣卡塔琳娜州和南里奥格兰德州的燃煤电厂使用的是当地产的煤炭。该地区蕴藏着大约 30 亿吨煤炭，是拉丁美洲探明储量最大的煤炭产区。

该地区主要出产的是亚烟煤，灰分含量高，放热效率高，更适合用于发电。

巴西北部和东北部马拉尼昂州、帕拉州和伯南布哥州的热电厂使用的是进口煤，主要来自哥伦比亚，比国产煤炭价格高很多。

“坎迪奥塔的发电用煤每吨 20 美元，马拉尼昂从哥伦比亚进口的煤每吨 280 美元。坎迪奥塔的煤是世界上最便宜的。”该地区矿工工会主席瓦格纳·洛佩斯·平托说。

专家认为，中国的煤炭消费已经在 2013 或 2014 年达到峰值。那时候，中国总理李克强曾宣布“向污染宣战”，政府也采取行动抗击污染，减少二氧化碳排放。这么做一方面是为了回应公众对有毒空气污染、以及人们为此付出的高昂的经济和健康代价的担忧，另一方面也是为了遵守国际气候变化协议。

至少有 12 个中国省份已经禁止新建燃煤电厂，以求能够完成在 2020 年之前将国家电网中的煤电占比从 2015 年的 64% 削减至 58% 以下的目标。

加拉格尔表示，中国境外煤炭融资增长的原因之一在于，世界银行和泛美开发银行（IDB）等多家国际银行都因为煤炭严重的环境影响而停止了这方面的投资。

中外对话与中东欧银行监测网络搜集的数据显示，2015 年以来有一系列中国投资的燃煤电厂项目宣布立项或已进入开发阶段。地图显示，中国银行和企业目前参与了至少 79 个海外煤电项目，总装机超过 5200 万千瓦，这一数字超出了美

“中国境外煤炭融资增长的原因之一在于，世界银行和泛美开发银行（IDB）等多家国际银行都因为煤炭严重的环境影响而停止了这方面的投资。”

巴西圣卡塔琳娜州的坎迪奥塔燃煤电厂

国计划在2020年之前关闭的4600万千瓦总装机。

美国气候政策行动组织的另一项研究发现，2010至2014年间，中国海外燃煤电厂投资额至少为380亿美元，另外还宣布了总价720亿美元的多个投资计划，虽然这些项目不一定会悉数落地。

巴西煤炭协会会长路易斯·费尔南多·赞坎说，法国能源集团（前苏伊士集团）子公司巴西特拉克特贝尔公司（Tractebel）正在挂牌出售的位于南部圣卡塔琳娜州的一系列热电厂，是中国能源公司在巴西进行煤炭投资的主要兴趣所在。这家公司出售的煤电机组总计120万千瓦。路透社消息称，对这些资产感兴趣的买家不下10个。

其中的Pampa Sul热电站的总装机为34万千瓦，承建方为中国山东电力工程咨询院（SDEPCI）。此外，中国近来还在巴西参与建设了另一座电站——南里奥格兰德州坎迪奥塔项目三期，承建商为山东电力建设第一工程公司（简称山东电建一公司），该公司在巴西承包了一系列能源项目，包括贝洛蒙特水力发电站的巨型输电线路。

坎迪奥塔电站前两个机组在山东电建一公司开始项目三期建设之前就已投入运营，一直饱受各种问题困扰。2016年，巴西环境与可再生自然资源研究所（IBAMA）以未能达到污染物排放控制标准为由关闭电站。除了其他违规行为，研究所发现电站废水最大流量及油脂率不符合标准，因而宣布暂停A、B两个机组的运营，并开出了4张总计2300万美元的罚单。

中国企业涉足南里奥格兰德州煤炭开采部门的历史至少可以追溯到2005年，那时候坎迪奥塔三期还在讨论中。“目前，中国人参与的是燃煤电厂的建设，他们建造了上一批电站。但有传闻说他们对我们的煤田也有兴趣，想在南里奥格兰德州开采和生产煤炭。”洛佩斯·平托说。

据当地媒体Sul21报道，有人开出诱人的价格想从坎迪奥塔土地所有者手中购买藏有煤炭的土地。但在该地区采掘煤炭需持有采矿许可，而州政府控制的里奥格兰德矿业公司目前拥有该地区的独家采矿许可。一场决定该公司是否实施私有化改

制的公投预计将于今年年底进行，这将为国外投资者进入该地区铺平道路。

与此同时，巴西煤炭协会正在游说政府制定计划，推动巴西燃煤电厂的现代化发展。赞坎表示，当前巴西市场上的能源过剩问题意味着已经没有新建热电项目的空间了。

巴西煤炭消费持续上升

根据巴西联邦政府相关机构能源研究公司发布的国家能源平衡表中的数据，2010 至 2015 年间，巴西国内钢铁和煤电行业煤和焦炭（或焦煤）的消费量增长了 22%。

巴西能源结构中煤炭占比从 2010 年的 5.2% 上涨至 2015 年的 5.9%，其主要原因在于炼钢厂生产钢和金属板所用焦煤的增长。

由于国内煤炭质量低下，巴西约 50% 的煤和焦炭需求都得通过进口来满足。国家矿产部技术人员路易斯·保罗·德奥利维拉·阿劳约透露，进口的煤炭中约 90% 为焦煤，而燃煤电厂的用煤仅占 10%。

巴西钢厂使用的进口煤炭主要来自澳大利亚、美国、俄罗斯、加拿大、哥伦比亚、委内瑞拉、印度尼西亚和南非，受技术所限，巴西国产煤炭不适合钢厂使用。

近年来，中国煤炭在巴西煤炭进口中所占比例虽小，但地位却日益重要。进口自中国的煤炭虽不到巴西煤炭总进口量的 2%，但都是焦煤。巴西政府贸易数据门户网站 AliceWeb 发布的信息显示，2010 至 2016 年间，巴西从中国进口焦煤 430 万吨，总价值 12.8 亿美元。

进口自中国的焦煤数量在 2015 年达到顶峰，从 2014 年的 68.1 万吨增长至 143 万吨。“2015 年，随着中国土木建筑和重工业发展放缓，国内焦煤需求减少。”位于北京的绿色和平组织东亚分部煤炭专家柳力解释道。2016 年，巴西从中国进口煤炭的数量下降至 48 万吨。

同样是 2016 年，进口自中国的焦煤有 97% 被运往巴西国家钢铁公司（CSN）位于里约热内卢伊塔瓜伊的货运枢纽。过去 5 年间，CSN 购买了价值 6.1 亿美元的中国煤炭。

据路透社消息，CSN 正在考虑将旗下子公司孔戈尼亚斯矿石（Congonhas Ores）25% 的股份出售给中巴新能环国际投资有限公司（CBSteel）。而孔戈尼亚斯矿石公司控制着伊塔瓜伊货运枢纽。

柳力告诉中拉对话：“煤炭运输会对环境造成影响，但远小于燃烧煤炭炼钢产生的影响”。

焦煤相对来说比较软，因运输不当碎裂或被压碎时，会释放出含有硫等污染物的粉尘。

CSN 官网上没有注明抵港煤炭所应遵守的环境政策，但该公司在一封电子邮件中说：“煤炭运输不会产生环境影响”。据 CSN 新闻办公室证实，运至该公司货运枢纽的煤炭全部用于满足自身的需求。

里约热内卢联邦大学化学系教授克劳迪内·德苏扎·吉马良斯说，环境影响取决于焦炭的运输方式。“即便是用火车或卡车（运输），如果不是密闭存储或用油布覆盖起来，也会对大气造成严重的影响。在 CSN 场地上处理（焦炭），将其分类堆放时也会造成严重的污染，因为除了机械处理，自然风也会导致 MP10、MP2.5 这样的可吸入颗粒物的扩散。”吉马良斯说。

CSN 和巴西其他 10 家钢铁公司一起，发布了一份关于行业可持续性的年度报告。

炼钢是焦煤的主要用途，2000 至 2015 年间，巴西的钢材进口增长了 245.2%，其中来自中国的进口量更是增长了 13418%，令人颇为震惊。2000 年，中国仅占巴西进口钢材总量的 1.4%，而到 2015 年已经增长至超过一半。

本文由本站与Instituto Clima e Sociedade联合撰写，英文原文首发于中外对话子网站中拉对话。

米尔顿·莱亚尔，新闻工作者，同时也是电影制片人，他为国际杂志撰写关于基础设施、能源和环境方面的文章

Chinese involvement in Brazilian coal causes concern

Is it wise for Chinese banks and contractors to increase their stake in Brazil's coal sector while China cuts coal consumption domestically?

□ Milton Leal

While China moves forward with its national policy to reduce coal consumption and increase generation of electricity from renewable sources, Chinese banks and contractors specialising in coal-fired power are looking abroad to develop energy projects, including in Brazil.

"Since 2013, we have seen external financing for coal from the China Development Bank (CDB) grow 40%," says Kevin Gallagher, professor of global development at Boston University. He adds: "If we look at historic Chinese investment in the coal sector abroad, 75% of this total took place over the last four years. China represents 8% of global external financing for the coal sector."

In Brazil, there are 22 coal-burning thermoelectric plants which add up to 3.7 gigawatts (GW) of installed capacity. Together, they represent 2.3% of Brazil's total installed capacity. The coal-fired plants located in the south of the country in the states of Santa Catarina and Rio Grande do Sul use Brazilian coal produced in the region, which has the largest known coal reserves in Latin America – around 3 billion tonnes.

The most common types of coal in the state are sub-bituminous and have a high ash content, which means it has a high calorific value and is more suitable for generating electricity.

The thermoelectric plants in the north and northeast of the country in Maranhão, Pará, and Pernambuco use imported coal, mainly from Colombia, which is much more expensive than domestic coal.

"In Candiota we produce for US$20 per tonne. In Maranhão, they pay US$280 per tonne of coal from Colombia. The coal from Candiota is the cheapest in the world," says president of the regional miners' union Wagner Lopes Pinto.

Experts believe China's coal consumption peaked in 2013 or 2014. At the time, Chinese Premier Li Keqiang declared a "war on pollution" and the government has taken measures to bring it down in order to reduce CO2 emissions. This is in part a response to public concern about toxic air pollution in China, its high economic and health costs of toxic air pollution, but also to comply with international climate change agreements.

Construction of coal-fired thermoelectric plants has been

> Chinese banks and companies are currently involved in at least 79 coal-generation projects abroad.

banned in at least 12 Chinese provinces to help the country meet its goal of reducing the share of coal-generated energy in its national grid from 64% in 2015 to 58% or less by 2020.

According to Gallagher, one of the reasons behind the increased Chinese presence in external financing for coal is because several international banks such as the World Bank and the Inter-American Development Bank (IDB) decided to stop funding it due to its high environmental impact.

Data compiled by *chinadialogue* and CEE Bankwatch Network show that a series of Chinese-funded thermoelectric coal projects have been announced or are in development as of 2015. According to the map, Chinese banks and companies are currently involved in at least 79 coal-generation projects abroad with a total capacity of more than 52 GW, more than the 46 GW of power plants scheduled to be taken offline in the United States by 2020.

Another study from the Climate Policy Initiative in the United States found that China invested at least US$38 billion in coal plants abroad between 2010 and 2014, and also announced plans for an additional US$72 billion in investments, although not all have firm commitments.

Luiz Fernando Zancan, president of the Brazilian Coal Association (Associação Brasileira de Carvão Mineral, ABCM), says the business opportunity for Chinese Energy Companies in the Brazilian coal sector is mainly linked to the thermoelectric plants that were put up for sale by the Engie group, formerly GDF Suez (Tractebel, in Brazil), which are located in Santa Catarina in southern Brazil. All in all, 1.2 GW of coal-powered units are for sale. According to Reuters there are more than 10 players interested in the assets.

One of these plants, the Pampa Sul thermal plant, has a 340 megawatt (MW) capacity and is being constructed by Chinese company SDEPCI. Furthermore, the Chinese also recently participated in the construction of another plant in Brazil – Phase C of the Candiota Complex in Rio Grande do Sul. This project was built by contractor SEPCO1, which operates a series of energy projects in Brazil, including the giant transmission line for the Belo Monte hydropower plant.

The Candiota plant's first and second units, which were in operation prior to SEPCO1 building the third phase of the project, have been beset by problems. In 2016, the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) closed the plant for not meeting pollutant emission control parameters. IBAMA froze operations at Units A and B and imposed four fines totalling US$23 million after identifying violations in the maximum flow of effluents and the rates of oil and grease, among other irregularities.

Chinese companies have been part of the coal mining sector Rio Grande do Sul since at least 2005, when the construction of Candiota Phase C was under discussion. "Currently, the Chinese are present in construction of coal-fired thermoelectric plants. They built the last plants. But there is a lot of talk that they are also interested in getting into our coal fields, mining and producing coal here in Rio Grande do Sul," says Lopes Pinto.

According to the local media outlet Sul21, land-owners in Candiota are receiving tempting offers to sell their land with coal deposits. But mining permission is required to exploit coal in the region. Companhia Riograndense de Mineração (CRM), which is controlled by the state government, currently has exclusive permission. A public vote on privatising the company is expected by the end of this year and this could pave the way for foreign investors to arrive in the region.

Meanwhile, ABCM is lobbying the government to create a plan to modernise Brazil's coal-burning thermal power plants. According to Zancan, the current surplus of energy in the Brazilian market means there is no space to construct new thermoelectric projects.

Coal consumption growing in Brazil

Brazilian consumption of coal and coke (or coking coal), which is used in steel industry furnaces, and also to supply power plants, increased 22% from 2010 to 2015 according to data from the National Energy Balance produced by the Energy Research Company, an agency connected to the federal government.

Coal's share in the Brazilian energy mix grew from 5.2% in 2010 to 5.9% in 2015, mainly the result of coking coal used by steel mills to produce steel and metal sheets.

Due to the low quality of domestic coal, Brazil needs to import around 50% of the country's coal and coke needs. Of all the coal imported, around 90% is coking coal and only 10% is coal used for thermal power plants, according to Luís Paulo de Oliveira Araújo, a technician with the National Department of Mineral Production (DNPM), a federal agency.

Brazil imports coal for use in steelworks mainly from Australia, the United States, Russia, Canada, Colombia, Venezuela, Indonesia, and South Africa, because domestic coal does not have the appropriate properties for this function using current technology.

In recent years, China has accounted for a small but increasingly significant percentage of Brazil's coal imports. Though the total is less than 2%, all of Brazil's coal imports from China are coking coal. From 2010 to 2016, Brazil imported 4.3 million tonnes of coking coal from China, worth US$1.28 billion, according to information obtained from the Brazilian government's AliceWeb trade data portal.

Imports of coking coal from China peaked in 2015, growing from 681,000 tonnes in 2014 to 1.43 million tonnes the following year. "In 2015, domestic demand for coking coal in China fell as the civil construction and heavy industry sectors slowed," explains Lauri Myllyvirta a coal expert at Beijing-based Greenpeace China. In 2016, Brazilian imports of Chinese coal dropped to 480,000 tonnes.

Also in 2016, 97% of coking coal imports from China went to the National Steelworks Company (CSN) cargo terminal in Itaguaí, Rio de Janeiro. In the last five years, CSN purchased US$ 610 million worth of Chinese coal.

According to Reuters, CSN is considering selling a 25% stake in Congonhas Ores, the subsidiary that controls the Itaguaí cargo terminal, to China Brazil Xinnenghuan International Investment (CBSteel).

Myllyvirta told Diálogo Chino: "there is an environmental impact resulting from transporting this fuel, but it is much lower than the burning of the coal itself to produce steel".

Coking coal is comparatively soft and when it breaks or is crushed can release a dust containing pollutants such as sulphur if not transported properly.

The CSN website does not mention the company's environmental policy for the coal that arrives to its port. In an e-mail, the company said: "There is no environmental impact resulting from coal transport". CSN's press office confirmed that all the coal that arrives at the company's cargo terminal supplies the company itself.

Professor Claudinei de Souza Guimarães of the Federal University of Rio de Janeiro's chemistry department said any environmental impact depends on how the coke is transported. "Even train or truck [transport] will have a large impact on the atmosphere if they are not closed or covered with tarpaulins. Another very polluting situation is handling [coke] in the CSN yard when this resource is moved into piles, since besides the mechanical handling the wind itself contributes to emission of particulates, particularly MP10 and MP2.5, which can be inhaled," says the expert.

CSN, along with 10 other steel companies that have a presence in Brazil, publishes an annual report on sustainability in the sector.

While Brazilian imports of steel, the main product for which coking coal is used, grew 245.2% between 2000 and 2015, those from China grew by a staggering 13,418% over the period. In 2000, the Asian country accounted for 1.4% of total Brazilian steel imports. By 2015 it had risen to over half.

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把二氧化碳变成汽油，靠谱吗?

中国科学家实现了二氧化碳加氢制汽油转化效率的突破，这一技术有多大应用前景？对气候变化又意味着什么？

□ 冯 灏

理论上全球每年需要减少约420亿吨二氧化碳才能阻止气候继续恶化，除了直接减排，对已经产生的二氧化碳进行转化利用也一直是全球关注的热点。

但目前碳捕集与利用（CCU）技术对于减缓气候变化的贡献率难以超过1%，可谓杯水车薪。

中国科学家近期发表的一项把二氧化碳转化为汽油的新研究引起了广泛关注。中国科学院大连化学物理研究所葛庆杰、孙剑团队通过设计一种新型多功能复合催化剂，实现了高效率的二氧化碳加氢直接制取汽油。这一突破性研究成果于5月发表在《自然 - 通讯》杂志上。

之前已经有科学家试图用二氧化碳与氢分子试制汽油，但此前这一化学反应所得的烃类化合物中最多只有一半是汽油馏分烃，而此次研究设计的催化剂在接近工业生产的条件下将这一比例提高到78%。

研究团队成员葛庆杰告诉中外对话，研究团队不仅实现了技术突破，而且采用了接近工业生产的操作条件和氯化铁等相对便宜的催化剂原料。葛表示，对于该技术研究的工业化应用，团队还是比较有信心的，但同时又面临诸多困难，如原料气纯度要求、汽油品质验证及产率进一步提高等等，如顺利的话，预计五年左右可完成工业化示范。

用化学反应把二氧化碳直接回收为能源，这无异于是将自然界耗费亿万年的化石燃料生成过程在实验室里缩短到一瞬间。有这么好的事吗？

首先，真的可以减碳吗?

从理论上看，该工艺以二氧化碳作为原料，产物是石油；石油燃烧，回到二氧化碳。过程本身是碳中和的，并不会直接减少全过程的二氧化碳排放。但是，相比开采化石能源，这一工艺生成的能源也不会造成更多二氧化碳从地下进入大气。

而这一技术可以转化的二氧化碳量级受制于二氧化碳的获得渠道。目前二氧化碳的捕集工艺还不能处理空气中低浓度二氧化碳。葛庆杰也表示，这一过程适合应用于大量集中排放二氧化碳的工业设施。

能源转换效率够高吗?

“用化学反应把二氧化碳直接回收为能源，这无异于是将自然界耗费亿万年的化石燃料生成过程在实验室里缩短到一瞬间。”

从热量投入角度来看，一般的二氧化碳活化需要吸收能量，国家发展和改革委员会能源研究所研究员姜克隽表示二氧化碳分子因为性质稳定，对其活化很难真正实现小的能源投入获得大的能源产出。

对此，葛庆杰解释说，二氧化碳加氢制汽油烃燃料是一放热过程，能耗相对较低。

但是，在化学反应开始之前，将原料气体加温加压到所需要的温度和压力，仍然是需要能量的，制氢本身更是大量耗能。姜克隽认为，如果投入工业化应用，考虑整个过程的能量输入，比如燃烧化石能源的电力供给，再加上能量在转化过程中的损耗，从能源效率来讲可能是不划算的。

最后，经济上可行吗？

二氧化碳制汽油要实现工业化应用，最大的瓶颈还在其经济性差。

葛庆杰指出，虽然反应涉及到的催化剂、工艺和设备等都非常接近石油化工的目前配置，但是其原料氢气的成本及来源是限制该过程经济性及应用推广的一个关键因素。他认为这个工艺适合某些特定的应用场景，比如氢气廉价、二氧化碳富集的地方。

比如，对于海上作业的应用场景来说，目前海上工业设备大规模燃烧化石能源，排放出二氧化碳，溶解在海水里，造成海水酸化，严重威胁海洋生物及海洋环境。通过电解海水，生成氢气和氧气，氧气可以被运用到供给海下人员呼吸，而二氧化碳加氢可以生成液体燃料，为相关设备供给能源，形成更好的循环，同时还有利于海水的中性化，改善海洋环境。

一些工业界人士则对这一技术的应用不甚乐观。北京石油化工工程有限公司负责科研的工程技术人员告诉中外对话，这项在实验室理论条件下可行的技术，如果投入工业化生产，其生成的汽油成本是难以估算的，可能数倍于目前的汽油。

冯灏，中外对话研究员

Scientists want to power cars with waste CO_2

Chinese scientists have developed a more efficient way of creating gasoline from CO_2 and hydrogen

□ Feng Hao

In future, waste sources of CO2 could be used to create fuels

It takes hundreds of millions of years to produce fossil fuels by natural processes but new scientific research is looking to short-cut that process by using waste carbon dioxide (CO_2).

To avoid the worst effects of climate change, the world needs to dramatically reduce manmade CO_2 emissions from their current levels of 32 metric gigatons. In parallel with efforts to directly reduce CO_2 emissions, scientists are

also researching methods of carbon capture and utilisation (CCU), which takes CO_2 emissions from sources such as coal-fired power plants and uses them in other industrial processes.

One example of the innovative deployment of CCU is in the creation of petrochemicals such as gasoline. Rather than creating gasoline directly from fossil fuels, a CO_2 hydrogenation reaction can be used instead to produce it.

New research by Chinese scientists searching for a more efficient approach to hydrogenation sparked interest when it was published in Nature Communications in May 2017.

Ge Qingjie and Sun Jian's research team at the Chinese Academy of Sciences' Dalian Institute of Chemical Physics have designed a new multi-functional, compound catalyst that converts CO_2 and hydrogen into gasoline.

In previous experiments with this process no more than half of the hydrocarbons obtained were in the right range for vehicle fuel. The catalyst used in the latest Chinese study, by contrast, produced 78% gasoline-range hydrocarbons.

Ge Qingjie told chinadialogue that this wasn't just a technical breakthrough, it could also be a commercial one. Operating conditions used were close to those found in industry, which is promising in terms of commercialising the process; while the catalyst was produced from relatively cheap materials such as iron chloride (produced when hydrochloric acid is added to steel waste).

Ge said the team is confident the research will have industrial applications. But several hurdles remain given that the process requires very pure raw materials and further efficiency improvements must be made. If these obstacles can be overcome then we could see the roll out of the fuel production process in five years.

Reducing carbon emissions

An advantage of the process is that it produces less carbon emissions because it utilises waste CO_2 that is already available.

The overall carbon footprint of making gasoline using the process would depend on where the CO_2 comes from. Drawing on CO_2 from the air would reduce the size of the footprint.

Ge Qingjie indicated that the process is best suited for use alongside industries that emit large quantities of CO2, such as coal-fired power. However, technologies to capture CO2 from the atmosphere have also been demonstrated (although not fully commercialised), which could make the process carbon neutral.

Is it efficient?

The activation of CO_2 and its hydrogenation to gasoline presents a challenge because CO_2 is a stable, inert molecule, said Jiang Kejuan, a researcher at the National Development and Reform Commission's Energy Research Institute.

This means significant energy is needed to raise the temperature and pressure levels needed for the process. The production of hydrogen itself is also energy intensive. Jiang pointed out that in industrial use the overall energy input may mean the process is not worthwhile.

Is it commercially viable?

Although the catalysts, techniques and equipment are all close to those currently used in the petrochemical industry, the cost and availability of hydrogen is a major limiting factor, said Ge Qingjie. He thinks the process will be suitable only in certain scenarios. For example, where there is proximity to cheap sources of hydrogen and concentrated carbon dioxide emissions.

However, some industry insiders are also sceptical whether the process could be commercialised. An engineer with Beijing Petrochemical Engineering told chinadialogue that while the process may be viable in laboratory conditions, any fuel produced in industrial applications could be several times as expensive as current alternatives.

Feng Hao is a researcher at chinadialogue.

给鱼吃素，可行吗?

以鱼养鱼的水产养殖业日渐威胁全球渔业的可持续性，素鱼饲料的研发已成为紧迫议题。

□ 张 春

水产养殖业正在经历持续快速增长。据联合国粮农组织统计，从2009年到2014年，全球水产养殖业年产量从5570万吨激增至7380万吨，年增长率5.4%，水产养殖产量对渔业产量贡献率也从38%增长到44%。

相比之下，同一时期内捕捞渔业产量年增长率仅为0.6%，对渔业产量贡献年年下降。过度捕捞已经使近三分之一的水产种群不可持续，相比几近停滞的捕捞渔业，水产养殖业已经成为渔业更有潜力的增长点。与此同时，水产养殖业的资源消耗也日益成为地球的沉重负担。

水产养殖磨耗海洋食物链根基

当前，为了保证养殖产品的营养和能量供应，几乎所有的鱼虾饲料都需要添加一定比例的鱼粉。鱼粉添加饲料的使用，使原本岌岌可危的海洋生态环境雪上加霜。

亚利桑那大学教授凯文·费兹蒙斯告诉中外对话，平均来说制作鱼粉的原材料只有10%-15%来自水产企业的边角料，其他部分来自直接捕捞的海洋鱼类。

用于制作鱼粉的鱼类，常处于食物链的下端，是三文鱼、海豚、鲨鱼、金枪鱼等肉食鱼类以及企鹅、海鸟等海洋动物的食物。大量捕捞这些鱼类，威胁着整个食物链的根基。地中海和黑海捕捞量自2007年以来下降了近三分之一，和沙丁鱼、鲣鱼等食物链低端的鱼类减少不无关系。

鱼类专家从直径6英尺的试养池打捞鳟鱼测量重量和尺寸。这些鳟鱼都是由素鱼饲料喂养的

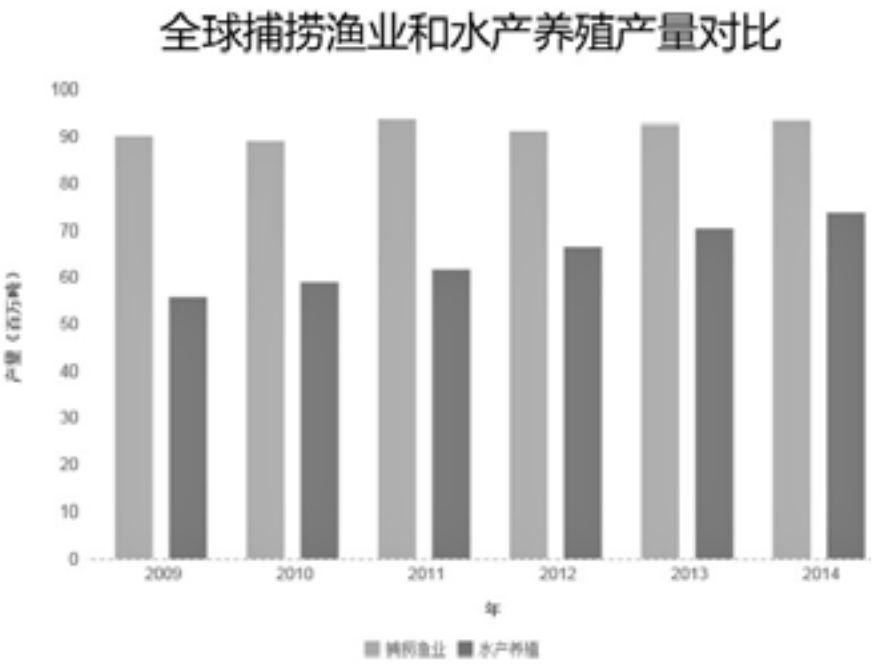
寻找鱼粉的替代品

寻找鱼粉的替代品因此成为一项越来越紧迫的任务。事实上，由于鱼粉的成本不低，价格大约为每吨八千到一万人民币，一直以来业界都在寻找替代品以降低成本。

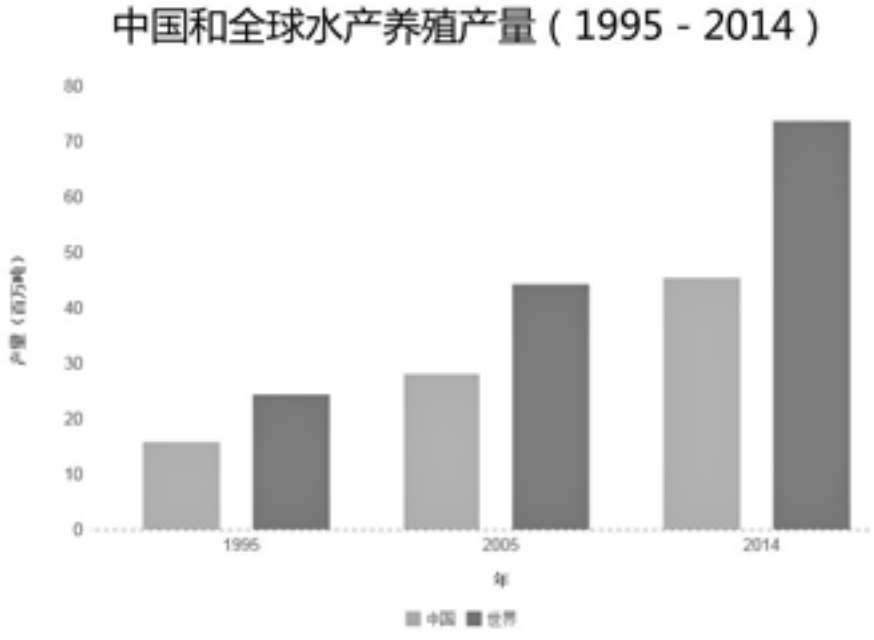
为了推动替代方案的研发推广，包括费兹蒙斯在内的多位关心海洋生态系统可持续性的水产科学家牵头发起了一项全球“素鱼饲料”生产和销售比赛。

这场比赛于 2016 年 5 月开始，将于今年九月结束，第一个完成 10 万吨素鱼饲料销售额度的企业将获得 20 万美元奖金。

目前有来自中国、缅甸、泰国等七国的七家公司参加比赛。尽管参赛公司数量不大，但已有多家世界领先的大企业承诺将会试用胜出企业的无鱼添加饲料，其中包括来自挪威的全球最大大西洋三文鱼养殖公司“Marine Harvest”，中国饲料企业澳华集团、广东粤海饲料集团，以及来自日本的大日养鲤场。Fitzsmmons 认为这是实现“可行的、高性价比的无鱼、无鱼油添加饲料的转折点。”



数据来源：联合国粮农组织



数据来源：联合国粮农组织

中国制造的素鱼饲料

中国企业对这一竞赛的参与和关注格外引人注目。根据中国渔业统计年鉴，2015 年中国水产养殖总产量超过 4937 万吨，比其他所有国家的总和还多。而粮农组织数据显示，从 1995 年到 2014 年的 20 年间，中国水产养殖产量一直占全球 60% 以上。

中国企业也具备开发素鱼饲料的动力：除了降成本的需求，中国水产养殖业也需要尽量降低对进口鱼粉的依赖。根据一位鱼粉研究专家的分析，中国鱼粉产量已经大幅增长，2016 年达到 31 万吨，接近全球鱼粉头号产地秘鲁的一半，但国内产量仍然无法满足持续增加的需求。加上中国主要进口国秘鲁鱼粉产量受到频繁发生的厄尔尼诺现象的影响波动很大，中国的也需要一个更稳定、可持续的饲料配方。

参加比赛的中国企业名为广东恒兴饲料实业股份有限公司。比赛成绩记录显示，到2016年底恒兴在比赛中遥遥领先，卖出了四万八千公吨不含鱼粉和鱼油的鱼饲料。排在第二的一家缅甸公司卖出了两万八千公吨。

恒兴公司负责研发的程成荣博士在邮件中告诉中外对话，该公司已经有多年研发无鱼配方饲料的经验。他还介绍，恒兴在比赛过程中售卖的素鱼饲料，大约占到同时间段公司销售额的16%，而购买了素饲料的客户反馈很好。

程博士告诉中外对话，恒兴公司此次参与售卖的素鱼饲料，以罗非鱼、草鱼等淡水鱼类饲料为主——这两种鱼类对蛋白质的需求并不高。根据他提供的数据，使用以小麦、豆粕和菜籽粕代替鱼粉的饲料养殖的罗非鱼，均重与喂食含鱼粉饲料的鱼相当。中国罗非鱼产量接近全球一半。

费兹蒙斯对中国企业的参与感到兴奋。“恒兴是中国最大的鱼饲料公司之一，他们的参与将推动中国的养殖户和其他企业向不添加鱼粉和鱼油的鱼饲料转变，对此我们感到非常高兴。”他说。

循序渐进的替代

目前，水产养殖要完全不用鱼粉还不可行。程博士就指出，恒兴公司出售的无鱼粉添加的罗非鱼饲料主要用于养殖的中后期。致力于推广罗非鱼可持续养殖的“智渔可持续科技发展研究中心”创始人兼执行主任韩寒也告诉中外对话，目前罗非鱼完全不用鱼粉还不可能。

但全球水产饲料中的鱼粉添加比例已经在持续下降。在研发出全素饲料之前，恒兴公司的罗非鱼饲料鱼粉含量就已经从三分之一降到了5%。

素鱼饲料也许暂时还无法完全覆盖水产养殖业的需求，但这场素鱼饲料销售竞赛更大的意义，是推动饲料企业和养殖企业共同行动逐渐降低对鱼粉的依赖。

程博士认为：“传统水产需要消耗大量鱼粉，另一方面全球渔业捕捞和鱼粉产量已经饱和，如何减少鱼粉使用量已是重要议题。”

张春，中外对话高级研究员

Vegetarian fishmeal – a winning formula?

China farms more fish than all other countries combined. Now it's developing a recipe that could help save dwindling fish stocks

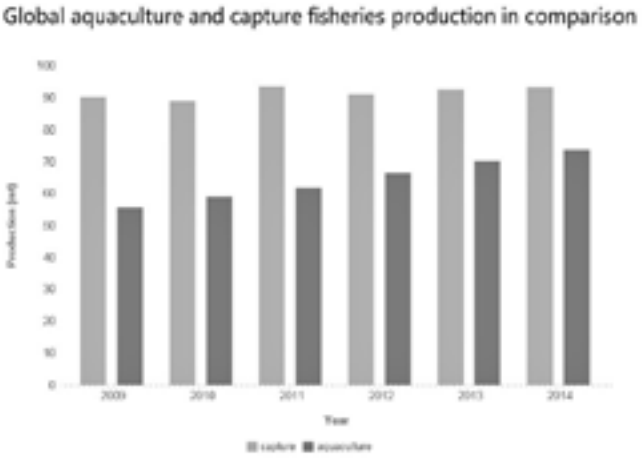
□ Zhang Chun

Aquaculture is seeing record high levels of growth. Between 2009 and 2014 the farming of fish, crustaceans and other aquatic organisms saw output grow from 55.7 million tonnes to 73.8 million tonnes, according to the United Nations Food and Agriculture Organization (FAO).

In the same period, fish farming increased from 38% to 44% of the total output of fisheries worldwide, with average growth of 5.4% each year.

In contrast, the capture of wild fish grew just 0.6% annually, with their contribution to total output declining. Today almost one third of wild fish stocks are overfished, estimate the FAO.

With wild fisheries stagnating, the growth potential of aquaculture is even greater. Yet the consumption of resources involved in aquaculture is placing an increasing burden on the planet.



Data source: Food and Agriculture Organisation (FAO)

Broken food chains

To ensure the nutritive and calorific value of aquaculture products, fishmeal is added to the feed of almost all farmed fish and shrimp. Fishmeal is manufactured from small, wild-caught marine fish and contains a high percentage of bones and oil. But the industrial production of protein-rich fishmeal is placing an unsustainable burden on vulnerable marine ecosystems.

On average only 10-15% of raw materials used in fishmeal are made from the by-products of the aquaculture sector itself, with the rest caught from ocean fisheries,

Professor Kevin Fitzsimmons of the University of Arizona told chinadialogue.

The fish used to produce fishmeal are often found at the lower end of the food chain and therefore tend to also be sources of food for carnivorous species, such as salmon, dolphins, sharks and tuna, as well as for penguins and marine birds. Harvesting these sources on a large scale threatens the entire food chain.

Catches in the Mediterranean and Black Sea have fallen by almost a third since 2007, according to the FAO. This has been attributed to the falling number of smaller fish at the lower end of the food chain, such as sardines and anchovies.

Fish-free food

The search for an alternative to fishmeal has become an urgent priority worldwide. The aquaculture sector has been on the hunt for a new fish formula for some time. Aside from the environmental impacts there is an economic motivation as fishmeal is expensive to produce. One tonne costs 9,500 to 11,000 yuan (US$1,400-1,600), according to a Chinese website for feed traders, which means buyers are seeking cheaper alternatives.

To promote the research and development of a cost-competitive alternative that can support the sustainable development of fisheries, Fitzsimmons and a group of concerned scientists launched the F3 Fish-Free Feed Challenge.

Launched in November 2015, the contest challenges aquafeed companies to produce a formula that omits marine animal oil. The first company to produce or sell 100,000 metric tonnes (mT) will be awarded US$200,000 to support their business. If none of the contestants have met the 100,000 mT target by September 15, 2017, the prize will go to the company closest to the target.

“The fish used to produce fishmeal are often found at the lower end of the food chain and therefore tend to also be sources of food for carnivorous species.”

Desiccated black solider flies are proving popular with farmed fish

So far seven different companies from seven nations, including China, Myanmar and Thailand, have entered. A number of leading farming firms have already committed to using feed from the winner, including Norwegian company Marine Harvest, which is the world’s largest farmer of Atlantic salmon, and Chinese feed firms Award Global and Guangdong Yuehai Feedstuff Group, as well as Japanese fish farming firm Dainichi.

Fitzsimmons calls this “a turning point toward viable and cost-effective alternatives to fishmeal and fish oil.”

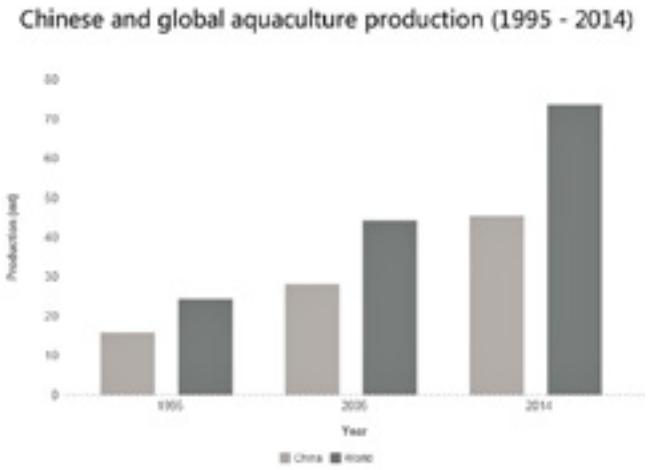
China steps up

The level of Chinese interest in the competition has been striking and is especially important. According to industry statistics, China’s aquaculture sector produced 49.37 million tonnes in 2015, more than all other countries combined.

FAO figures show that China accounted for 60% of global aquaculture output between 1995 and 2014.

Operating at such scale, Chinese firms have clear incentives to develop an alternative fish feed as it could reduce the cost of fish farming and reliance on imported fishmeal.

According to French fishmeal analyst Jean-Francois



Data source: Food and Agriculture Organisation (FAO)

Mittaine, China's production of fishmeal has already significantly increased, reaching 310,000 tonnes in 2016, almost half of the output of Peru, which is currently the world's biggest fishmeal producer.

But domestic production cannot keep pace with demand. Production in Peru, China's main source of fishmeal imports, is regularly interrupted by El Niño, an irregular warming of ocean water in the equatorial Pacific region. China needs a more sustainable and consistent source to buffer its industry from climate and market-related disruptions.

The Chinese firm participating in the competition is Guangdong Evergreen Feed Industry Co Ltd. The competition records show that as of the end of 2016 the company was far in the lead, having sold 48,000 tonnes of feed free of fish oil or fishmeal. A Myanmar company is in second place and has sold 28,000 tonnes.

Cheng Chengrong is in charge of research and development at Evergreen Feed. Via email he told chinadialogue that the company has been working on fish-free feed for years. He also explained the sales of fish-free feed during the period of the competition accounted for 16% of the company's total feed sales, and that feedback from customers had been positive.

Cheng added that the feed the company has entered in the competition is targeted primarily at freshwater fish such as grass carp and tilapia, which require less protein, making it easier to create a non-meat substitute.

Figures from the company indicate that tilapia fed on the new feed, which consists of wheat, soybean meal and rapeseed meal, grow to similar average weights as fish fed on traditional feed. China produces almost one half of the world's tilapia.

Fitzsimmons is excited about the Chinese firm's entry. "It's one of China' s largest fish feed firms and their participation will help prompt Chinese fish farmers and other firms to switch to feeds free from fish meal and fish oil. We are very happy about that," he says.

Step-by-step

Despite the progress, it is impractical for companies to shift completely to the new feeds.

Cheng pointed out that his company's tilapia feed is used in the middle and later stages of farming. Han Han, founder and executive director of the China Blue Sustainability Institute, which works to encourage sustainable farming of tilapia, told chinadialogue that it is not yet possible to raise tilapia without any fishmeal use.

However, the percentage of fishmeal in fish feed worldwide is falling. Prior to developing the entirely fish-free version, Evergreen Feed had cut its fishmeal content from 33% to 5%.

Fish-free feed may not yet be able to meet all of the industry's needs, but the competition is still of huge significance. It is encouraging both the feed manufacturers and the fish farmers to work together to reduce reliance on fishmeal and move to a more sustainable aquaculture model.

According to Cheng Chengrong: "Traditional fish farming requires large quantities of fish meal, but global fish catches and fish meal production are already saturated. How to reduce the use of fish meal is now the important issue."

Zhang Chun is a senior researcher at chinadialogue.

绿色电力证书要来了

绿色电力证书是否能助力可再生能源行业的发展，将取决于配套政策的实施。

□ 张 春

中国可再生能源的补贴机制正在转变。从 7 月 1 日起，发电和售电企业就可以开始自愿购买绿色电力证书（以下简称绿证），而所有搭配绿证出售的新能源电力不再享受电价补贴，这意味着可再生能源电价补贴的逐渐淡出。

绿证是国家对发电企业非水可再生能源上网电量颁发的电子认证。今年 2 月，发改委、财政部、能源局联合发布绿色电力证书核发和自愿认购交易制度通知（以下简称通知），宣告风电和光伏企业（不包括分布式光伏）可以开始申请绿证。

电价补贴难以为继

当前光伏和风力发电的成本仍普遍高于火电，但电网收购价和火电一样，因此企业需要依赖政府提供额外的上网电价补贴。

此前国家以直接补贴电价的方式支持新能源发电企业的发展，也即新能源电价高出火电企业的部分，由国家财政买单。但补贴结算过程漫长，而且由于可再生能源的快速增长，财政补贴负担也越来越大。

到 2016 年上半年，可再生能源补贴的发放缺口累计已经达到 550 亿元人民币，电价补贴难以继续。而绿证机制则既可降低政府直接补贴的压力，又能帮助新能源发电企业更快收回成本。

绿证将搭配绿电配额制

单纯的上网电价补贴并没有促进可再生能源并网率的提高，保证新能源的市场份额。以风电为例，2016 年全国平均弃风率为 17%，最高的甘肃、新疆则达到 43% 和 38%。弃风弃光率高居不下，已经成为中国可再生能源行业继续发展的主要障碍。

绿证更大的意义，在于它对可再生能源发电配额制度的支持，即强制规定发电企业或电网输出一定比例的可再生能源电力。

理论上，想要优化能源结构的单位可以通过购买绿证来实现目标，个人也可以通过认购绿证帮助可再生能源的发展。中国国家能源局于 2016 年 4 月颁布了配额制度的征求意见稿，提出到 2020 年，火电企业必须有 15% 以上的电力来自非水可再生能源。对于不具备可再生能源发电条件的企业，购买绿证将是唯一的出路。

> “2020年，火电企业必须有15%以上的电力来自非水可再生能源。
> 对于不具备可再生能源发电条件的企业，购买绿证将是唯一的出路。”

配额制对中国实现此前的气候承诺——非化石能源（含水电、核电）比例到2020年占到一次能源消费的15%，至关重要。有专家估算，这一承诺体现在发电量上，相当于非水可再生能源发电量达到燃煤火电发电量的14.4%，与配额制所设定的目标基本吻合。

厦门大学能源政策研究院院长林伯强指出："在电力行业整体供大于求背景下，真正可以有效解决弃风弃光的措施是推行可再生能源配额制，而绿色电力证书的交易可以为配额制提供灵活性、降低强制配额的成本。"

而能源局也透露，2018年政府很可能会推动配额考核和绿证强制交易。

纠结的燃煤电厂

目前，中国能源局发布的配额制文件仍在征求意见中，尚未正式出台。

作为火电绝对主力的煤电，往它们身上强加15%的非水可再生能源并不容易。一方面，煤电的产能过剩已经令这一行业利润下降，举步维艰。

此外，去年煤炭去产能给煤炭生产降了温，但产量下降导致煤价从去年下半年开始上涨，今年开年来涨幅继续增大。位于中国中部煤电大省宁夏的七家大型煤电企业近日联名上书宁夏经信委，要求煤炭降价。给自身难保的煤电企业再加购买绿证的负担，显然阻力不小。

另一个影响绿证和配额制开展的因素是企业为降低用能成本建设的自备煤电厂。它们不并网不进入销售，所以很难纳入绿证强制配比中。目前全国范围内自备电厂的规模尚不可知。

目前，强制购买绿证的规定是否会于2018年按时出台还不明朗。但可以确定的是，不论煤电面临的问题如何解决，如果没有配额制，绿证就将失去对中国能源结构的实质影响力。

绿证的前景

可再生能源配额制将保证绿证在初期阶段的推行，而从中远期看，绿电参与碳交易和电力市场改革或许将成为绿证制度能否持续施行的关键。

国家能源局新能源和可再生能源司处长李鹏介绍，绿证制度与碳减排交易体系可以形成天然的衔接，只需要明确绿色证书背后所代表的减排权益的归属，绿证即可顺利地参与碳排放权交易。

中国全国碳市场即将在今年内启动，规模超过欧盟碳市场，为全球最大。电力行业是被批准第一批参与碳排放权交易的八个行业之一。

另一方面，电力市场的改革速度可能会是决定绿证机制和可再生能源产业未来发展的决定性因素。当前中国采取政府统一定价机制，不管煤电还是新能源，上网电价都不受实际成本和市场供需关系的影响。这阻挡了发电成本变化快速传递到销售端。煤电成本波动难以预期的劣势和新能源发电成本稳步下降的优势都无法在电价中得到充分反映。

中国从2015年启动的新一轮电力体制改革的目标，就是让发电端和售电端都进行市场化交易，一改过去计划发电和统一电价售电的模式。改革顺利的话，新能源将可以和煤电公平竞争发电指标。

林伯强认为，由于成本原因短期内煤电的竞争力还是无法动摇，但在中国，技术层面风电和太阳能的成本下降速度很快，特别是光伏。从2011年到2016年，中国光伏发电硬件成本下降了70%。

李鹏认为，如果电力市场机制建设的方向不错，中长期成本的稳定可控将成为新能源的竞争优势，而出售绿证和参与碳交易市场也将帮助新能源项目进一步扩大对化石能源发电项目的环境外部性优势。

张春，中外对话高级研究员

Green certificates to bolster renewables market

China's new trading scheme will reform energy subsidies with a market-friendly approach

□ Zhang Chun

China's state-planned power system is in for a shock as the government is planning to change the way it subsidises renewable energy and introduce a quota that nudges electricity companies to invest in renewables.

In the first stage, electricity generators and retailers will be required to buy green electricity certificates (tradable certificates which prove that electricity has been generated through renewable energy sources) from July 1.

This is a significant departure from the current subsidy system, whereby the government pays generators a premium for renewable energy, and which will be gradually phased out.

In a proposed further stage – which is still open to consultation and has not been confirmed – electricity generators will be expected to increase the share of renewables in their portfolios to 15% by 2020 or be forced to make up the shortfall by buying green electricity certificates.

> "The new system is designed to reduce the financial burden on government."

Unsustainable subsidies

Energy from wind and solar sources is still more expensive than coal-fired power in China, but the price paid by the grid is the same regardless of where the power comes from. To encourage investment in renewables, the state has so far supported energy firms by directly subsidising the price paid by the grid – that is, the extra cost of buying renewable electricity as compared to coal-fired power.

But the subsidy system isn't working very well. Payments are slow to arrive, making it difficult for energy companies to recoup their investments. Meanwhile, the rapid expansion of renewables has increased the financial burden on the state. By the latter half of 2016, 55 billion yuan (US$8 billion) in subsidy payments was still outstanding.

Officials hope that the compulsory quotas for renewable energy will solve the country's chronic problem with curtailments

This is where green certificates come in. The new system is designed to reduce the financial burden on government by phasing out direct subsidies for renewables and shifting the cost onto companies trading certificates.

This will help renewable electricity firms see a quicker return on investment because electronic certificates will be awarded to generators (excluding hydro) as soon as power is delivered to the grid.

In February, the National Development and Reform Commission (NRDC), the Ministry of Finance, and the National Energy Authority (NEA) issued a document on the issuing and voluntary purchase of these certificates, telling wind and solar power generators (excluding distributed solar) that they could start the application process to receive certificates.

Renewable electricity standard

The government also wants to fix another problem facing the renewables sector. Unlike countries such as Germany that prioritise grid connections for renewables, there is no such requirement in China. One result of this is curtailments, for energy is wasted for failure to connect to the grid.

In 2016, 17% of wind power generation was wasted, with curtailment levels reaching 43% and 38% in Gansu and Xinjiang provinces, respectively. Wastage of wind and solar power has remained high and is the main obstacle holding back the country's renewables sector.

The new system of green electricity certificates seeks to address this problem by introducing a portfolio standard, or quota. This means electricity generators and distributors must source a certain proportion of their electricity production from renewables.

In April 2016, the NEA held a public consultation on the quota proposal, saying that by 2020 thermal power firms would be required to source 15% of their generation from non-hydro renewable sources. Those firms that cannot meet the 15% quota for renewable electricity in their own generation mix will be obliged to purchase green electricity certificates.

The portfolio standard would provide a straightforward mechanism to help China meet its existing climate commitments, in particular the goal to increase non-fossil sources of energy, including hydro and nuclear, to 15% of all primary energy consumption by 2020.

Energy experts estimate that China could hit the 15% target if existing coal-fired power generators increase non-fossil sources as a share of their generation to 14.4% – basically the same percentage set by the quota.

Lin Boqiang, dean of the China Institute for Energy Policy Studies at Xiamen University, pointed out that "with an overall surplus of electricity, a quota is the real solution to wastage of wind and solar power, and the trading of green electricity certificates will make the quota system flexible and reduce the costs of compulsory quotas."

The NEA also revealed that in 2018 the government is likely to implement quota audits and compulsory certificate trading, though this is not yet official.

The coal conundrum

In China, thermal power is dominated by the coal sector, so forcing generators to increases non-hydro renewables to 15% of their electricity production will not be easy.

The coal sector is facing major challenges so opposition to efforts forcing already struggling firms to pay for green electricity certificates is expected.

Surplus capacity has already resulted in falling profits and paralysis in the coal sector. Furthermore, efforts to reduce coal output resulted in a rise in coal prices from the latter half of 2016, with increases accelerating this year. In response, seven coal power generating firms in Ningxia, northern China, a major producer of coal-fired power, penned a joint letter to the provincial authorities calling for prices to be lowered.

Another problem is captive coal-fired power plants. These are facilities that companies build as a source of cheap power and which are not connected to the grid and do not sell power. This lack of grid transparency makes it hard for regulators to take them into account when enforcing a green electricity quota system. It is currently unknown how much power these facilities generate.

It is also unclear whether these new rules will come into force as scheduled in 2018. But regardless of how coal power's problems are resolved, green electricity certificates will have no real impact on China's energy structure unless accompanied by a quota system.

Prospects for green electricity certificates

In the short term, it is hoped that a quota system will ensure the success of green certificates by encouraging all generators to develop renewables and to reduce wastage of existing renewables.

However, in the medium to long term green carbon trading and electricity market reforms will be key to the sustainability of the certificate system.

Li Peng, head of the new and renewable energy department at the NEA explained that green energy certificates could easily be traded on carbon markets. However, as renewable electricity has no direct carbon emissions further regulation will be required to clarify ownership of the carbon emission rights implied by the certificates.

China's national carbon market is set to launch this year and will overtake the EU Emission Trading System as the world's largest. The electricity sector is one of eight sectorsthat will participate.

The speed of electricity market reforms will also be decisive in the development of the certificate system. Currently the government sets the price at which electricity is sold to the grid – the cost of generation and market demand is, therefore, not a factor, regardless of whether you are buying coal power or solar.

> "The rapid cost reductions associated with renewables development will be better reflected in electricity prices."

This prevents changes in generation costs being passed on to consumers, so neither the rapid fluctuations in costs of coal power, or the steady decrease in the cost of renewables are fully reflected in electricity prices.

The aim of the electricity reforms that China launched in 2015 was to introduce a market between electricity generators and retailers, replacing the planned generation of power and price-setting. If the reforms are successful then renewable sources of energy will be able to compete with coal-fired power on a more level playing field.

This will make renewables more competitive by removing the priority of coal power over renewables in generation, and with the removal of price-setting, the rapid cost reductions associated with renewables development will be better reflected in electricity prices.

According to Li Boqiang coal will remain competitive for some time, as it is cheaper. But China is seeing the costs of wind and solar technology drop rapidly, particularly in the case of solar PV solar. Between 2011 and 2016 the cost of PV solar components dropped 70%.

According to Li Peng, if market reforms are well-implemented then prices will be more stable in the medium to long term and give renewables a competitive advantage. The sale of green certificates and carbon trading will further expand their environmental advantages over fossil fuels.

Zhang Chun is a senior researcher at chinadialogue.

新制度提高中国制造业环保门槛

中国正试图用更精细的新制度让电子产品和汽车生产者负担更多环境责任。

□ 冯 灏

中国家用电器研究院的调研显示，2015年非正规渠道回收了86%的废弃电子产品

垃圾，尤其是含有多种有毒有害物质的电子垃圾，已经成为全球面临的环境问题。根据联合国大学发布的《2014 年全球电子垃圾监控》，2014 年全球共产生 4180 万吨电子垃圾，其中，中国产生 600 万吨，占比 14.3%，体量不容小觑。

以手机为例，中国信息通信研究院数据显示，2016 年中国手机市场出货量为 5.6 亿部。业界预测未来几年中国每年更新的手机数量可能会达到 4 亿至 5 亿部，而此前废旧手机的沉积量就已达到 10 亿部左右。这些被弃之不用的产品给环境带来了巨大隐患。

很快，中国电子产品行业将面临新的环保制度压力。根据国务院发布的生产者责任延伸（EPR）制度推行方案，发改委、环保部等政府部门需在 2017 年底前提出电器电子产品回收处理工作方案。国务院同时提出，到 2025 年，中国将基本完善重点品种的 EPR 制度，产品生态设计“取得重大进展”，至少一半的废弃产品得到规范回收与循环利用。

生产者将负担哪些责任

新的 EPR 制度定义了四项生产者的环境责任，分别是开展生态设计、使用再生原料、规范回收利用和加强信息公开。前两项试图从源头减少产品环境足迹，后两项则试图让生产者承担起产品全生命周期的追溯和回收责任。

北京大学城市与环境学院副教授童昕长期以来关注 EPR 制度。她告诉中外对话，废物管理一直都不是环保部一家之责，主要问题是九龙治水，条块分割矛盾比较突出。新的制度“定了调子”：全链条都要负起责任，而生产者又是这个链条的关键。

首批将推行 EPR 的重点产品为四类，分别是电器电子产品、汽车、铅酸蓄电池和饮料包装。

对这些行业而言，实行 EPR 必然意味着成本的增加。对此，联合国环境署 - 同济大学环境与可持续发展学院教授杜欢政认为，成本的确是生产者关心的重要问题，但是名义上是生产者责任，其实最终会通过产品价格的上涨，转嫁到消费者头上，这一点在选择试点行业的时候就已经列入考虑。

以家电行业为例，其产业集聚度高，大企业占市场份额的八到九成，在这样的行业中，生产者如果将环境成本内化到生产过程中，其导致的成本上升是全行业性的。这意味着如果上升的成本难以在盈利空间内被消化，那么产品的价格会以整个行业的维度上涨，最终由消费者承担。

EPR制度新在哪里

新的 EPR 制度试图完善中国现有的废弃电子产品回收利用制度。此前，中国于 2008 年颁布《循环经济促进法》，提出了在生产、流通和消费等过程中减少资源消耗和废物产生，以及生产者对产品全生命周期环境足迹负责的原则，但并未提出可操作性的管理规章。

2009 年，中国推出具有操作性的《废弃电器电子产品回收处理管理条例》，其中包括废弃电子电器产品的目录制度、电子产品处理基金制度、处理企业资格许可制度等一系列沿用至今的制度。但这一条例只局限在回收处置环节的规范化，并不尝试倒逼生产设计环节的改善。

新的 EPR 制度是首次在操作层面，从原料选择、产品设计到回收处理，将产品全生命周期的环境足迹的控制纳入实际操作规程中。

此外，EPR 制度还希望探索新的促进电子垃圾正规回收的方式。例如，该制度首次提出建立依托互联网商业模式的电子产品回收机制，以方便消费者更多地使用正规渠道，而非随意丢弃或卖给非正规废品回收者。

将市场机制和垃圾回收的公共事业有效结合、形成符合消费者习惯的新的回收渠道，是 EPR 制度开启的改革方向。

事实上，已经有一批电子垃圾回收网络平台在探索正规而市场化的新模式，例如香蕉皮、阿拉环保网、回收哥、咸鱼、爱回收等。

EPR制度与非正式回收大军

政府之所以要想方设法促进正规回收处理的普及，是因为目前中国大部分电子垃圾绕过了正规渠道，流入无资质的回收者和处理商手中。据中国家用电器研究院的调研，2015 年，非正规渠道回收了 86% 的废弃电子产品。

政府对于电子废弃物处理企业有着严格的资格许可和总量控制，目前拿到环保部处理资格许可的企业仅有 109 家。多位专家告诉中外对话，由于大量废弃产品被不规范的小工厂、小摊贩收去，正规处理企业根本“吃不饱”，设备大比例空转。

工信部中国电子信息产业发展研究院（赛迪智库）节能与环保研究所副所长李博洋告诉中外对话，有资质的处理企业需要建设符合国家环保要求的生产线，采用合规的技术和设备对废弃物进行拆解、处置、利用等，而且需要对员工实施基本的劳动保护，一条生产线就好几千万，在与个体游商的成本竞争中完全不占优势。

尽管电子产品处理基金对正规处理厂家予以补贴，但按季度发放的补贴在实际操作中有相当程度的拖欠，甚至有拖欠一年以上的情况。

李博洋坦言，非正规渠道不可控且难以监管，所以政府希望把废弃产品尽量拉到正规渠道来。

但个体拾荒者也对城市环境的维持起着重要的作用。EPR 制度只能触及正规的生产和回收企业，忽略了这个群体。

非正式回收和处理一方面导致低价值零部件的随意丢弃，产生二次污染，加重环境负担。另一方面，在失业保险、劳动安全和健康方面，非正规回收业者不受法律保护，属于不受制度照拂的弱势群体。事实上，对这些必要环节的省略正是这一灰色产业链的竞争优势所在。

童昕表示，正规和非正规回收处理之间的关系，是目前政策面临的一个比较棘手的问题，如果不控制拾荒的部分，体系建了也是白建，根本收不到废弃物。但她又强调，简单的剥夺拾荒者的饭碗是否可行，仍然是一个复杂的问题。

冯灏，中外对话研究员

China to release e-waste plan by year end

New reforms will target manufacturers of cars, lead batteries and drinks packaging

□ Feng Hao

Unlike your everyday consumer rubbish, electronics waste is especially challenging to deal with because it contains a range of hazardous substances. The world produced 41.8 million tonnes of waste electronics (e-waste) in 2014, according to the United Nations University's 2014 Global E-Waste Monitor. Of that, six million tonnes, or 14.3%, was produced in China.

Take mobile phones as an example of the e-waste challenge. Data from the China Academy of Information and Communications Technology shows that China shipped in 560 million mobile devices in 2016. Industry insiders estimate that between 400 to 500 million mobiles could be discarded in favour of new handsets annually in China in coming years. And this is on top of the one billion mobiles already dumped in the country.

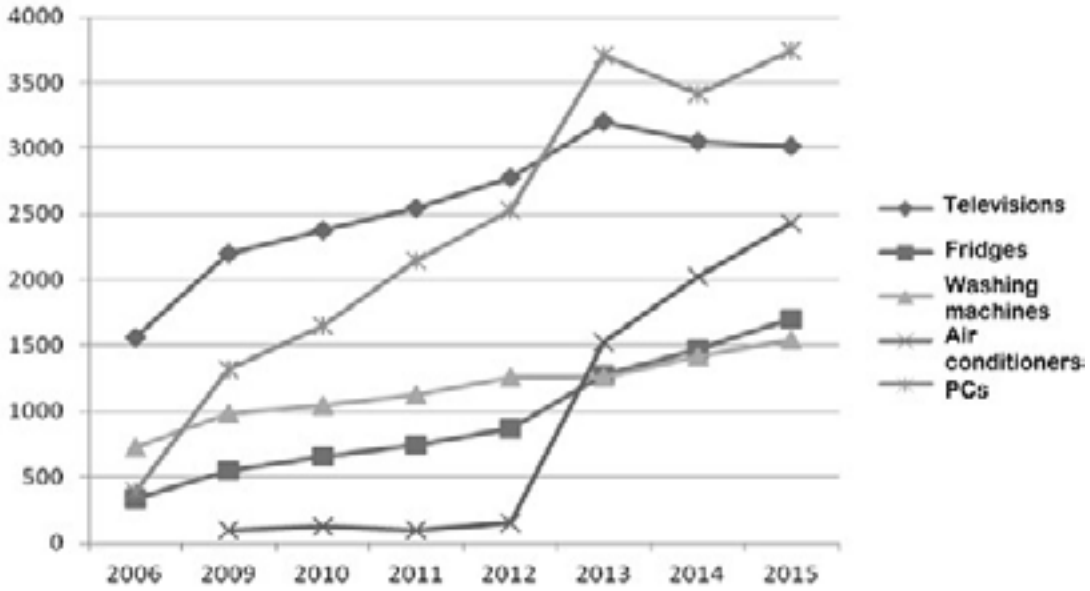
China's e-waste industry is in for an upgrade though. In January, the State Council released a document calling for an Extended Producer Responsibility (EPR) system. By the end of 2017, the Ministry of Environmental Protection and other government bodies must put forward a proposal for recycling of electric (devices that use electricity, such as fridges, hairdriers and microwaves) and electronic products (devices that alter electric currents internally using switches, such as computers or mobile phones).

And this is just the start. By 2025, the State Council wants to see an EPR system in place for key product types, "major advances" in environmental product design, and for at least half of discarded products to be reclaimed and recycled.

Manufacturer responsibilities

To do this, the proposed EPR system establishes four areas of manufacturer responsibility: producing environmentally-friendly designs, using recycled materials, standardising waste management and recycling processes, and disclosing data on recycling. The first two areas seek to reduce the environmental footprint of products at source whereas the second two push manufacturers to take responsibility for tracking and

Quantities of domestic appliances owned by Chinese households (10,000s)



Source CHEARI, White Paper on WEEE Recycling Industry in China 2015

reusing products throughout their respective lifecycles.

Tong Xin is a professor at Peking University's College of Urban and Environmental Sciences who studies EPR systems. She told chinadialogue that waste management has never been the sole responsibility of the Ministry of Environmental Protection before. The new approach is designed to overcome the problem of divided and overlapping responsibilities across multiple government bodies because under the new system all aspects of the industrial chain will be held responsible, and manufacturers are a key player in those chains.

To begin with, the EPR system will focus on four product types: electric and electronic products, cars, lead-acid batteries, and drinks packaging.

Inevitably, this will mean increased costs for manufacturers in these sectors, which is a major concern for them, says Du Huanzheng, a professor at the UN Environment, Tongji Institute of Environment for Sustainable Development. The extra costs from recycling are expected to be passed onto consumers through higher prices.

What's new about the EPR?

The new EPR system aims to improve the current recycling system for electronic products that dates to 2008 or after. This is when China issued the Circular Economy Promotion Law to reduce consumption of resources and creation of waste in manufacturing, logistics and consumption, and to make manufacturers responsible for the lifecycle environmental footprint of their products. However, no practical rules for implementation of the law were put in place.

In 2009 regulations were issued for the recycling and disposal of discarded electric and electronic products, including a list of products covered, a fund for disposal of electronic products, and licensing for firms handling the waste. These rules are still in place today but they only apply to recycling and disposal, meaning there's no effort to improve design and manufacturing.

The new EPR system tries to put this right. It's the first attempt regulate across the entire product lifecycle – from selection of materials, to design, to recycling and disposal.

The EPR system also encourages more formal methods of electronics recycling. It proposes online recycling channels to make it easier for consumers to access formal recycling, rather than simply discarding electronics or selling them to informal recyclers.

The system also aims to combine market mechanisms with recycling, creating a new recycling channel that suits consumer habits. There are already several online recycling platforms that are experimenting with formal market-based models such as Xiangjiaopi, Alahb, Huishouge, and Aihuishou.

The informal recycling sector

The government wants to promote greater use of the formal recycling sector because currently the bulk of electronic waste is handled by informal recyclers. According to a survey by CHEARI the informal sector handled 86% of China's electronic waste in 2015.

One of the problems with this is that low-value components may be discarded incorrectly, resulting in secondary pollution and environmental damage. Workers have no labour, health and safety protections either, leaving them especially vulnerable. But it is these failures that make the informal sector so competitive.

The government has imposed strict licensing and limits on the number of waste firms in the formal sector – currently the Ministry of Environmental Protection has licensed only 109 companies. But several experts told *chinadialogue* that large quantities of discarded products are snapped up by small scale workshops and traders, leaving nothing left for larger firms, meaning such facilities lie idle.

Li Boyang is deputy head of the Energy Saving and Environmental Protection Research Centre at the Ministry of Industry and Information Technology's China Electronics and Information Industry Development Research Institute (CCIDWise).

Li told *chinadialogue* that licensed disposal firms require production lines that meet national environment standards, and which use suitable technology to dismantle, discard and reuse waste, all whilst providing basic protections for employees. This means a single production line can cost tens of million yuan – leaving these firms at a huge disadvantage compared to smaller and more flexible informal traders.

Although the electronic product disposal fund subsidies formal recyclers, those subsidies are issued quarterly and can be late, sometimes by as much as a year.

Li Boyang admits that it is difficult to regulate and manage the informal recycling sector, which is why the government hopes to direct as much electronic waste into the formal sector as possible. But individual waste-pickers do play an important role in keeping cities clean. However, this group is overlooked by the EPR system, which will only affect formal manufacturers and recyclers.

Tong Xin indicated that the relationship between the informal and formal sectors is difficult for the government. If the informal sector is not brought under control there is no point in building up the formal sector, as it will not obtain any waste. However, taking jobs away from the informal sector will be just as diffucult.

Feng Hao is a researcher at chinadialogue.

环境监测设备市场在中国崛起

环境保护的空前升温令各类环境监测设备市场在中国异军突起。

□ 龙·信鑫　关 婷

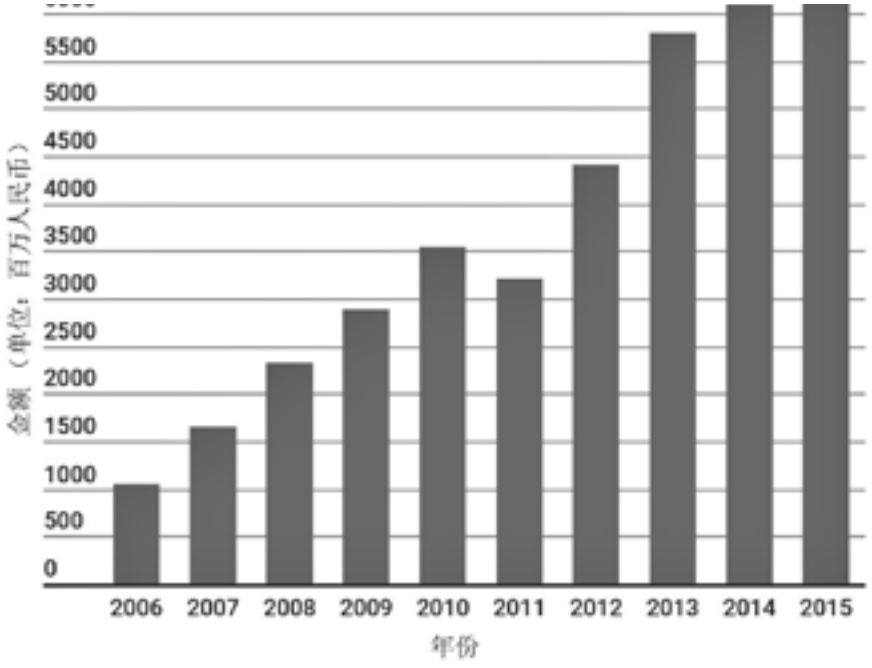
近年来，随着环保政策日趋严格，中国的环境技术市场发展迅速。其中，环境监测领域的发展尤为具有代表性。

系统性收集企业排放以及生态系统状况的相关信息是有效落实环境政策的基础。受政策的驱动，2006年 -2015 年间，环境监测设备销售增长了 6 倍（ 参见图 1 ）。在中国很有可能会继续加强环境治理的情况下，绿色科技将在未来几年成为环境产业的摇钱树。

环境政策驱动市场需求

为了应对日益严峻的环境挑战，中国的领导层实施了一系列新的政策措施，其中包括发布了治理空气、

图1 环境监测产品年销售额 (2006年-2015年)



来源：中国环境监测总站

水和土壤污染的行动计划，修订了《环境保护法》等。2015 年，中国政府通过了新的《大气污染防治法》，并同时发布声明，着重强调了治理空气污染的重要性。

其中一项措施就是强化全国环境监控网络。五年前，中国的监控网络高度碎片化，几乎无法起到协助环境监管落实的作用。随着环境政策和法规的趋紧，以及环境标准的提高，污染源监控、水体质量监控、空气质量监控、取样设备以及数据传输设备等各类监控设备的销售有了明显的提高。

政府政策对市场的影响在空气质量监测领域最为明显。2011 年，城市雾霾治理成为一项重要的政治议题。受此影响，2012 年空气监测设备的销量增长了两倍。首先，政府发布了更严格的治霾监管规则：根据环境大气质量标准（GB3095-2012）的要求，2012 年起，PM2.5、臭氧和一氧化碳的上限标准将纳入空气质量自动监测系统。这一规定导致空气监测设备的销量猛增（参见图 2）。

此外，政府决定通过增加数据采集点以及扩大覆盖范围的方式提升监测系统的有效性。2011 年之前，中国没有任何监测 PM2.5 的网络。2012 年，全国空气质量监测网络从覆盖 113 个主要城市、661 座监测站扩大至覆盖 338 个城市 1436 个监测站，提供包括 PM2.5 在内的多项空气质量数据。

东部沿海省份领军市场

政府政策对于环境技术市场的影响很强，但对于不同地区的影响

图 2 空气监测设备销售量（2012年-2015年）

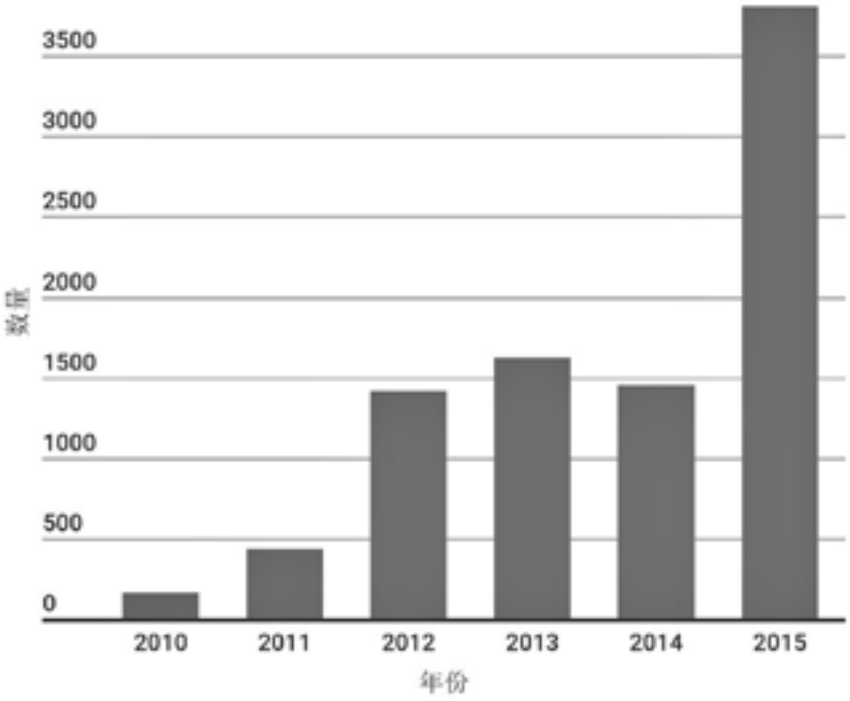
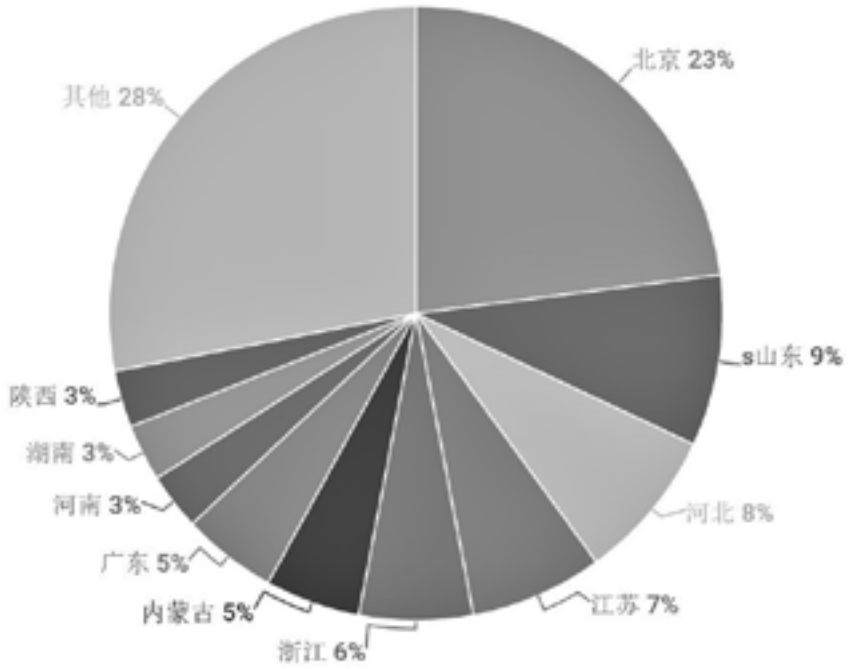


图 3 2015年环境监测市场销售地区分布



2015年不同地区环境监测产品销售量占比（数据来源：2015年环境监测器材产业发展报告）

效果却有所不同。多个因素造成了市场增长的不均衡分布，其中包括经济发展状况及地方政府财政实力的差异，公众认识差异以及不同地区公众对于环境清洁需求强烈程度的不同，当然还有环境污染程度的不同。图 3 表明，经济发展水平高、污染严重的省份对环境监测设备的需求最高。在这种情况下，环境监测市场的差异预计将持续下去，因为这种差异的根源在于不同地区之间发展水平的不均衡。

环境监测力度或将继续加强

当前政府的政策和表态表明，中国将继续加强环境监管力度，提高环境监测标准。2016 年 3 月，环境保护成为了全国人民代表大会的重要议题之一：李克强总理在会议上承诺，“加大力度，对排污企业全面实行在线监测”。环境保护部部长陈吉宁则宣布将很快发布一系列严格的环境方案以及政策，包括新的“土十条”等。

从中央政府释放的明确信号来看，在接下来几年中，环境监测市场将得到政府的强力支持。《生态环境监测网络建设方案》明确提出，中国将建立全国统一的实时在线环境监测系统。这为第三方环境监测的运行及维护开辟了全新的市场。

中欧合作新机遇

环境监测设备以及相关技术市场的发展为中欧环境合作创造了巨大的机遇。欧洲环境技术的供应商可以抓住中国不断增长的商业机遇，中国的环境质量也可以在外国企业的帮助下得到改善。

2009 年到 2014 年间，欧盟环境监测、分析和评估设备的对华出口总值增长超过一倍，折射出双方在这一领域的合作不断深入。其中，德国供应商的对华出口增长尤其显著。这种增长有望持续，因为相比其他很多行业，环境技术市场到目前为止没有受到中国经济放缓的下行压力影响。

龙 · 信鑫，德国墨卡托中国研究中心创新与环境课题研究团队负责人

关婷，墨卡托研究中心访问学者

Green tech is China's "gold mine"

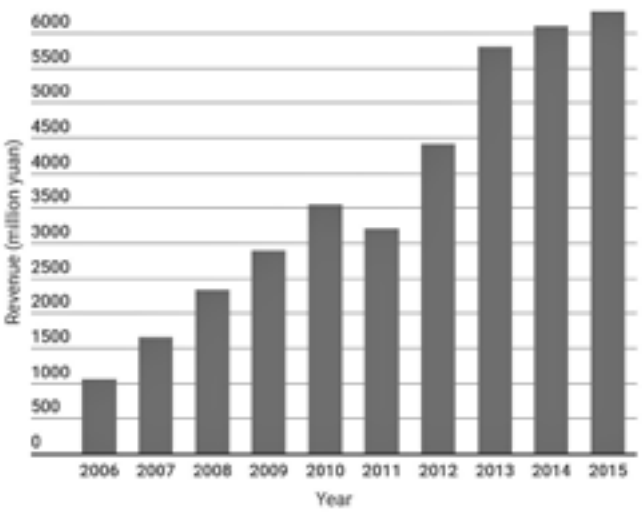
The market for environmental data is booming,
and with it the opportunity for China-Europe cooperation

□ Jost Wübbeke Guan Ting

China's market for environment-related technologies has experienced very rapid growth in recent years. China's tightening environmental policy is the central driving force behind this development. A case in point is the market for environmental monitoring.

The systematic gathering of information on enterprise emissions and eco-system conditions is the foundation of effective environmental policy. The policy-driven market saw a six-fold increase of sales of monitoring equipment between 2006 and 2015 (see figure 1). As China's efforts for a clean environment are likely to continue, green technology will be a gold mine for the environmental industry for the years to come.

Fig.1 Annual sales revenue of environmental monitoring products in China



Source: China Environmental Monitoring Center

China's environmental policy drives demand

To cope with the mounting environmental challenges, the Chinese leadership adopted a set of new policy measures. These include action plans to combat air, water and soil pollution and the revision of the Environmental Protection Law. In 2015, the Chinese government passed the new Air Pollution Law. This law was supported by an emphasis of government statements to tackle air pollution.

As part of these efforts, the government wants to enhance national monitoring networks. Five years ago, China had

a highly fragmented monitoring network that was hardly able to assist in implementing and enforcing environmental regulations. The policy shift towards stricter environmental protection and more stringent regulations and standards led to an increase of sales for all categories of monitoring equipment: pollution source monitoring, water quality monitoring, air quality monitoring, sampling apparatuses and data transmission instruments.

The effect of government policy on markets is most visible in the area of air quality monitoring. In 2011, urban smog became a priority on the political agenda. Consequently, the sales of air monitoring devices tripled in 2012. First, the government released stricter regulations to reduce smog: According to the Ambient Air Quality Standards (GB3095-2012), limits for PM2.5, O3 and CO were added to the automated monitoring system from 2012 onwards. That led to a surge in sales (see figure 2).

Second, the government decided to improve the validity of the monitoring system by increasing the number of data points and the covered area. Before 2011, China did not have any network for monitoring particles smaller than PM2.5. In 2012, the national air quality monitoring network expanded from 113 major cities and 661 monitoring sites to 338 cities with 1436 monitoring sites.

Eastern coastal provinces are lead markets

The effect of government policy on the market for environmental technology is strong, but varies by region. Multiple factors contribute to the uneven market growth. These include disparities of economic development and the financial capacities of local governments, public awareness and varying degrees of public demand for a clean environment, and, of course, the degree of environmental pollution. Figure 3 shows that provinces with higher economic development and a very high degree of pollution have the largest local markets for environmental monitoring equipment. Subsequently, disparities of the environmental monitoring market are expected to continue as they are rooted in the uneven development between regions.

Fig.2 Annual sale of air monitoring devices in China

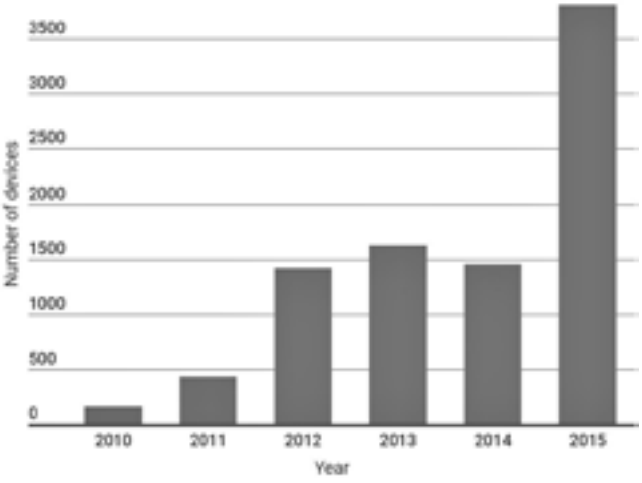
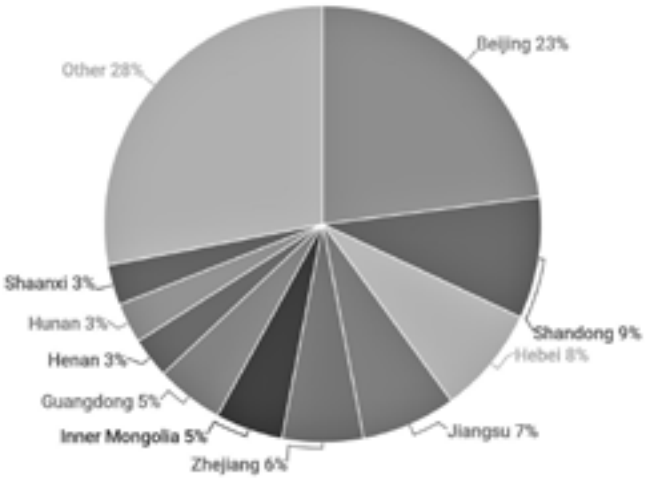


Fig.3 Regional distribution of environmental monitoring market sales in 2015



Share of environmental monitoring sales in different regions in 2015. (Source: Development Report on Environmental Monitoring Instrument Industry in 2015)

Policies likely to continue

Current policies and statements indicate that China is moving towards even tighter environmental regulations and stricter standards for environmental monitoring. In March 2016, environmental protection was high on the agenda at the National People's Congress: Premier Li Keqiang promised to "step up efforts and conduct online monitoring

of all polluting enterprises." Chen Jining, Minister of Environmental Protection, announced that a series of strict environmental plans and policies, including new laws to tackle soil pollution, would be released soon.

Beijing sent clear signals that the market for environmental monitoring would be strongly supported by the government in the coming years. The "Program for Constructing the Ecological Environment Monitoring Network", clearly states that China will establish a national unified real-time online environment monitoring system. This opens a new market for third-party environmental monitoring operations and maintenance.

Opportunities for cooperation between China and Europe

For Sino-European environmental cooperation, the growing market for environmental monitoring equipment and related technology creates huge opportunities. European suppliers of environmental technology can seize the growing business opportunities in China, while the quality of China's environment could improve with the help of these foreign enterprises.

Reflecting the deepening cooperation, the export value of devices for monitoring, analysing and assessing environmental conditions from the European Union to China more than doubled between 2009 and 2014. German suppliers in particular increased their sales to China. This growth is likely to continue. In contrast to many other industries, the market for environmental technology has so far not been affected by the downward pressure of the economic slowdown in China.

Jost Wübbeke is head of Programme Economy & Technology of the Mercator Institute for China Studies (MERICS).

Guan Ting is a visiting academic fellow at MERICS.

中国如何赢得电动车市场

中国在电动车领域雄心勃勃，但它能否吸取美国的经验教训，让补贴发挥作用？

□ 侯·安德

有些人认为中国将会引领全球储能和电动车市场的革命，但也有人觉得中国的电动车发展处在困境之中。

当然，现实情况更加微妙：中国电动车（EV）行业在过去几个月经历的一些问题，根源在于其电动车行业补贴制度亟待改革。

但对于未来的发展，中国可以汲取其他国家电动车补贴的经验，从而在合理控制成本的同时促进整个市场的发展。

中国已经是电动车和电池生产领域的领军者。2014 年 5 月，习近平主席指出，发展新能源汽车是中国迈向汽车强国的必由之路。

这并非一句空话。2013 年到 2016 年，中国新能源汽车年销售量从不到 2 万辆跃升至每年 35 万辆电动汽车和超过 11.5 万辆电动公交车，分别占全球电动汽车和电动公交车销售总量的 46% 和 95%。

销售量剧增在很大程度上得益于政府给予每辆电动乘用车 5 万元（约合 7000 美元）的补贴，以及在出租和公交领域推广电动汽车的举措。北京近期宣布，要将 6.7 万辆出租车换成电动车。中央政府也有计划对全部汽车制造商实行电动车指标制度。

动机

中国过去几年着力发展电动车的举动符合中国的若干政策目标。首先是以抓住未来产业市场机遇为宗旨的工业发展策略。中国认为，电动车是被外国汽车制造企业“忽视”的技术。通过在这一市场先发制人，中国可快速实现电池和电动车制造能力的规模化，并从中获益。

第二项目标是限制石油进口。中国的汽车保有量和驾车出行率都在快速增加，而中国的石油 65% 来自进口，中国如今已经成为世界上最大的石油进口国。

污染是第三个驱动因素。虽然交通领域的颗粒物和氮氧化物排放主要来自使用柴油的卡车，但交通运输已经成为城市空气污染的主要来源，并且增长非常迅速。对于严重依赖煤炭发电的中国来说，通过发展电动车来解决空气污染问题似乎有点奇怪，但多项研究显示，用电动车替代传统燃料汽车可以显著改善空气质量。未来，随着清洁能源的发展，电动车充电的问题也可以得到更好的解决。

补贴问题

但是补贴计划遇到了一些麻烦。去年，中国政府开始对骗补的企业进行罚款和处罚，其中至少有一家企业从未生产过电动车。

而随着 2016 年末电动车销量直线上升，补贴的成本开始显得难以承受。此外，对于享受补贴的电动车和电池的质量也存在很多批评的声音。

政府决定重新修订这一体系。今年一月，中国政府宣布调整完善补贴标准，电动车生产企业必须调整补贴

车型的质量参数。再加上一月份通常是电动车销售的淡季，电动车销量跌至每月 6000 多辆，同比下降 60%。

目前看来，这一调整只是短期的浮动。随着二月份车企重新调整了补贴车型的质量参数，销量有所回升。政府预计全年电动车销量增幅可达 40%，轻松超过 2016 年已相当可观的销售总量。

质量同样重要

中国电动车企业也在越来越关注产品质量。虽然很多本土热销品牌都是小型“城市用车”，但块头更大、满电续航里程较远的轿车和跨界车也即将下线。这种转变是必要的：调查显示，中国汽车买家对于车辆的续航里程和性能的要求与发达国家买家类似。

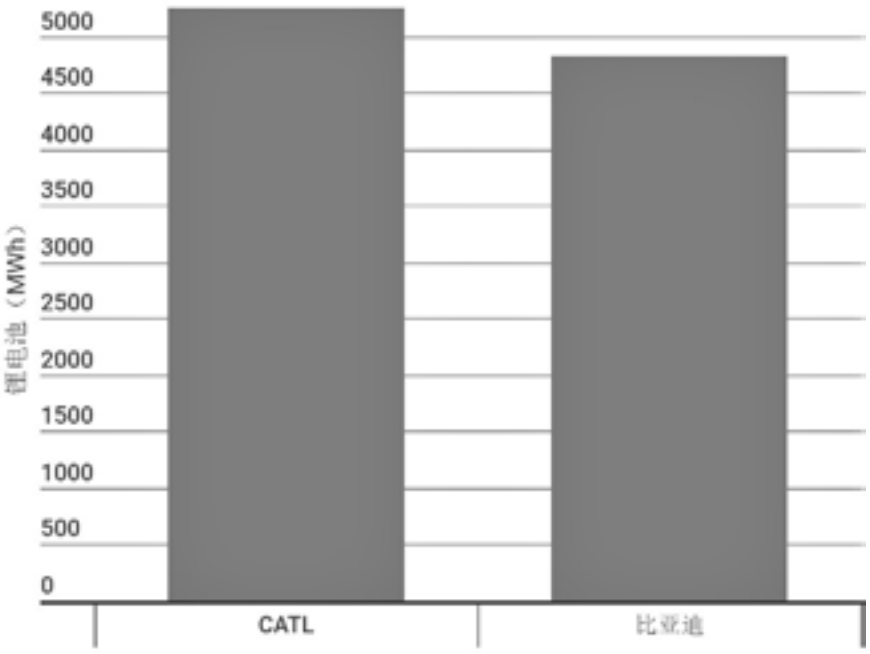
为了满足对更长续航里程的需求，中国需要提升其电池技术能力。中国已经针对镍锰钴三元电池出台了补贴政策，这种电池比第一代电动车使用的磷酸铁锂电池（LFP）性能更佳。

至于对车企实行的电动车指标，在多家车企和德国总理安吉拉·默克尔提出异议之后，主管部门已经决定修改方案。修订后的方案预计将于今年晚些时候正式出台。

中国已经从其他市场的经验和补贴计划中认识到，没有任何支持政策是完美的。另外，补贴计划设计中的些许调整都会造成结果的巨大差异，有时甚至会与政策初衷背道而驰。

但是在中国力求快速推广电动车的情况下，它可以从电动车发展历史更长的美国身上获得哪些值得借鉴的经验和教训呢？

各品牌电池制造商电动公交车销量（2016）



来源：EV Volumes (电动汽车销售数据), 2017

寻求平衡

最重要的经验或许就是：政策制定者必须在许多相互竞争的目标之间找到平衡点。从美国的电动车补贴政策和其它国家的相关政策中都可以看到这一点，包括可再生能源上网电价、税收抵免、配额、绿电交易，免费停车和专用车道等非货币补贴政策，等等。

一个目标是通过长期政策来提高市场的确定性，从而促使汽车生产厂商投资于汽车生产和新技术开发。但保持项目的灵活性也是必不可少的：项目必须可以不断发展，避免生产企业钻系统漏洞，也可以对慢于或者快于预期的技术 / 市场变化做出响应。

补贴必须提供更多选择，而不是更少

即便是奠定了加州在美国电动车发展中领先地位的零排放汽车政策也饱受批评。问题在于美国几乎一半的注册电动车都是总部位于加州的特斯拉品牌，致使有些人将之称为“特斯拉支持计划”。

另外，零排放汽车政策的设计者给予更长续航里程和氢燃料电池等创新技术额外的积分。但是，电池技术的发展速度远远超过了政策制定者的预期，导致特斯拉生产的远程电动车主导了美国市场。

汽车生产商向特斯拉付钱购买积分，这样一来，即便是它们生产的电动车数量少于州政府设定的目标，也可以满足零排放汽车政策的规定。自然资源保护协会（NRDC）的研究

显示，到2025年，汽车生产商生产的电动车数量只要达到加州年度汽车销售量的6%即可满足零排放目标，这一数字远远低于该州15%的预设目标。这样看来，政策并没有达到最初的目的，部分原因是零排放汽车积分额度的过剩。

借鉴经验1：虽然加州的零排放汽车政策鼓励创新和灵活性，但由于设计上的缺陷导致该州没有实现减排以及新能源车辆销售的整体目标。回过头来看，该政策导致一家企业主导市场，减少了消费者购买电动车时的选择。

不要惩罚先行者

针对混合动力车和电动车的美国联邦税收减免计划也在设计上存在一些问题。联邦政府视电池容量大小向每辆电动车提供最高7500美元的补贴，并在生产商累计售出20万辆插电式电动车后逐步停止对该企业的补贴。

这样的设计可以限制补贴总成本，同时，鼓励汽车生产商逐渐提升电动车相对传统汽车的成本竞争力。

但也有批评认为，该项目不仅没有给予先行者任何奖励，反而惩罚了较早采用电动车技术的厂商：特斯拉、通用、日产这些在美国市场上引领插电式电动车革命的厂商必须在没有补贴的情况下与享受补贴的后来者进行竞争。

从这个角度上说，这个项目与加州项目的问题正好相反——在加州，特斯拉这样的先行者可以说是获得了不公平优势的。

借鉴经验2：厂商电动车销售量达到一定数量之前，给每辆车定量发放补贴虽然有助于控制成本，但无法对先行者或者创新者予以充分的奖励。

注意不要偏向本土企业

中国还需要注意的一个问题就是外来的竞争。特斯拉的经验表明，给予本土企业额外的帮助既有好处也有坏处。许多加州消费者或许认为，换一种补贴方式或许可以引入更多选择，并且有助于更快地降低排放。

中国消费者对于外国汽车的需求很旺盛，而如今随着许多知名汽车生产商转向电动汽车，到2020年之前外国汽车生产商或将向中国市场投放更多高质量、具有全球竞争力的电动车型。

向国内车企倾斜的短期政策有效推动了中国电动车制造业的发展，但是面对每五年调整一次生产规划的外国领先车企在全球范围内的竞争，此类政策还能否持续下去呢？

另外，在国内厂商还不能生产高质量电动车的情况下引入电动车指标制度，虽然可以在短期内将外国企业拒之门外，但长期来看，却不利于国内厂商提高质量，难以与通用、福特、宝马、大众等外国竞争对手竞争。

借鉴经验3：综合考虑车辆和电池的性能特点对生产商进行奖励的长效计划，或许比面向厂商的固定电动车指标以及每车或每千瓦时的政府补贴更有吸引力。

中国或许还要考虑将补贴计划设定为达到一定总量目标后自动缩减的形式，而不是到期停止的方式。限定期限（比如某年的12月31日）停止或者缩减的补贴项目可以人为地制造兴衰周期，并造成不可预见的成本失控，许多国家的可再生能源上网电价实践已经证明了这一点。

借鉴经验4：实践证明，加州所采用的达成总量目标后逐步缩减补贴的方式已经有效地推动了当地太阳能和能源储存技术的发展，同样的方式在中国电动车行业也可以发挥作用。

没有任何补贴计划是完美的。中国的电动车行业发展规划进展快速，并有可能推动电池生产的规模化发展以及电池技术的提高，并有助于改善空气质量、降低石油消费。虽然中国的政策能否帮助中国成为全球电动车行业的领导者还有待观察，但我认为这值得期待。

侯·安德，保尔森基金会中国研究副主任

Four lessons to help China win the EV market

China has huge ambitions for EVs but what can it learn from the US about getting subsidies right?

□ Anders Hove

China's government hopes for EV sales to rise up to 40% this year despite deep cuts to consumer subsidies

Depending on who you listen to, China is either on the cusp of revolutionising world energy storage and electric vehicle (EV) markets, or in the throes of upheaval.

Of course, the reality is a bit more nuanced. Some of the issues experienced by the electric vehicle sector in the last few months have resulted from an urgent need to

reform the country's vehicle subsidy programme. But going forward, China can learn a few things from other countries in the design of its programme that will boost the market while limiting the scope for cost overruns.

China is already a global leader in EVs and battery manufacturing. In May 2014, President Xi Jinping declared that new energy vehicles would be a path for China to become a strong automotive manufacturer.

This was more than wishful thinking. From 2013 to 2016 the Chinese market leaped from under 20,000 new energy vehicles per year to more than 350,000 electric cars and over 115,000 electric buses, accounting for 46% of worldwide electric car sales and a whopping 95% of electric bus sales.

Sales have been boosted thanks to subsidies of up to 50,000 yuan (US$7,000) for a passenger car, and promotion of EVs for taxis and buses. Beijing is the latest city to announce that its 67,000 taxis will shift to EVs. The central government also has plans to apply an EV quota on all automakers.

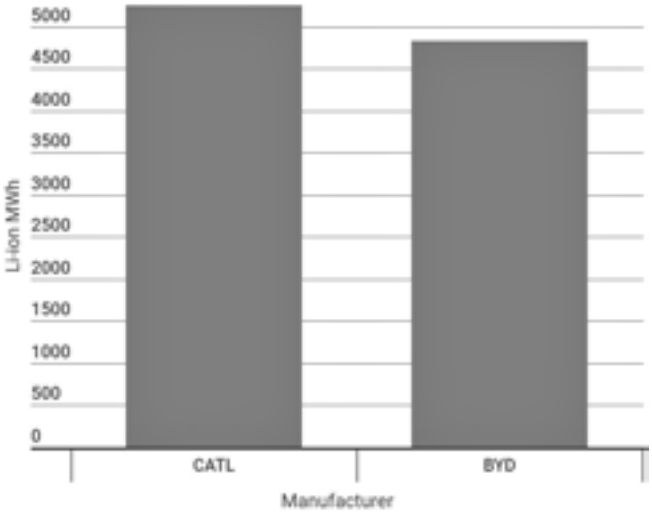
Motives

China's EV push over the past few years serves several policy goals. The first is an industrial strategy aimed at capturing markets for industries of the future. China has identified EVs as a technology that was "bypassed" by foreign automakers. By moving on this market, it can benefit from its ability to rapidly scale battery and EV manufacturing.

The second goal is to limit oil imports. Car ownership and driving are growing rapidly, and China, which imports 65% of its oil, is now the world's largest oil importing country.

Pollution is a third driver. Transportation is a major contributor to urban air pollution and rising rapidly, though the majority of transport particulate and NOx (nitrogen oxide) emissions come from diesel trucks. EVs may seem like a counterintuitive solution given China's coal-based power grid, but various studies have shown that switching to EVs produces a significant air quality benefit. And in the future, EVs could be charged when a surplus of clean energy is available.

EV bus battery manufacturing volumes in 2016



Source: EV Volumes, 2017

Subsidy problems

But China's subsidy programme has encountered problems. Last year the government began fining and punishing companies that had received subsidies illegally, including at least one that had never even made electric vehicles.

As EV sales rocketed upward in late 2016, the cost of subsidies started to look excessive. There has also been criticism about the quality of the subsidised cars and batteries.

The government decided to review the system. In January – always a slow month for EV sales – it announced that manufacturers would have to re-qualify in order for customers to continue to receive subsidies. EV sales plummeted to just over 6,000 per month, which is 60% lower than the same month the year before.

The adjustment is already looking like a short-term blip though. As companies re-qualified in February, sales have returned, and the government hopes for full-year EV sales to rise up to 40%, easily surpassing the impressive 2016 total.

Quality counts

Chinese EV manufacturers are focusing more on quality, too. While many of the leading domestic EVs are tiny "city vehicles", bigger sedans and crossovers with decent electric range are on the way. This transition is necessary: surveys show that Chinese car buyers have similar range and performance aspirations to those in the developed world.

To satisfy the demand for longer range vehicles, the country needs to upgrade its battery technology know-how. China has opened up subsidies for lithium-ion batteries with the nickel-manganese-cobalt (NMC) chemistry, which offers greater performance than lithium-iron-phosphate (LFP) used in first generation EVs.

As for an EV quota applied to automakers, policymakers have considered revising the scheme after several automakers, and German Chancellor Angela Merkel, raised concerns. A revised regulation is due out later this year.

China is already learning from experience and from subsidy programmes elsewhere that no support scheme is perfect. Also, that small tweaks in how subsidies are designed can produce major shifts in outcomes, and sometimes work against a policy's original goals.

But as China pursues rapid adoption of electric vehicles what specific lessons can it learn from the US, which has been chasing EVs for much longer?

Find your balance

Perhaps the most important lesson from EV subsidy programmes in the US, as well as various efforts worldwide with feed-in tariffs to promote renewable energy, tax credits, quotas, tradeable credits, non-monetary subsidies like free parking or special lane access, and other schemes, is that policymakers have to strike a balance between many competing goals.

One goal is providing market certainty through policies that will remain in place for long enough to enable carmakers to invest in production and new technologies. But flexibility is also necessary: programmes have to evolve to prevent companies gaming the system or respond to technology/market changes that are slower or faster than expected.

Subsidies must promote choice, not stifle it

Even California's zero-emission vehicle (ZEV) mandate, which is widely credited with driving the state's domination of vehicle electrification in the US, has faced heavy criticism. The problem is that almost half the nation's EV registrations are for California-based Tesla vehicles, leading some to call the state's zero-emissions vehicle credit-trading programme a "Tesla support scheme".

In addition, designers of the ZEV mandate gave extra credit for such innovations as longer EV range and hydrogen fuel cells. However, battery technology improved faster than policymakers anticipated, helping Tesla's longer-range EVs to dominate the domestic market.

Carmakers can pay Tesla to acquire credits and thereby meet the ZEV mandate even though they are producing fewer EVs than the state originally targeted. A Natural Resources Defense Council (NRDC) study showed that by 2025 carmakers can meet the zero-emission mandate by producing ZEVs that total only 6% of annual vehicle sales in the state, less than half the state's target of 15%. So the policy appears to be falling short, in part due to an oversupply of ZEV credits.

Takeaway 1: While California's programme encouraged innovation and flexibility, the design resulted in the state missing its targets for emissions reductions and total new energy vehicle sales. In retrospect, by allowing a single company to dominate the market, the original ZEV mandate design gave consumers fewer EV choices.

Avoid penalising early movers

The federal tax credit for hybrid and electric vehicles has faced design issues as well. The federal government offers up to US$7,500 per EV, depending on the size of the battery pack, and the subsidy begins phasing out after a carmaker sells a cumulative 200,000 plug-in vehicles.

This design ensures that the total cost to the government is limited while encouraging carmakers to gradually make EVs more cost-competitive with conventional cars.

But critics complain that the programme gives no credit

for early action. In fact, it even penalises early-adopters: Tesla, GM, and Nissan, which pioneered the plug-in revolution in the US, will be competing subsidy-free against latecomers that are still subsidised.

In a way, this is the opposite problem from California, where the early-mover Tesla arguably received an unfair advantage.

Takeaway 2: A flat per-vehicle subsidy capped after an automaker sells a certain number of EVs helps limit costs but doesn't reward first-movers or innovation.

Beware favouring domestic companies

Another consideration for China is the role of foreign competition. As Tesla shows, there are pros and cons to giving domestic companies a leg-up. Many California customers may feel a different approach to subsidies would result in more choice and faster emissions reductions.

In China's case, there is strong consumer demand for foreign vehicles, and now that many leading automakers are shifting to EVs, foreign carmakers are likely to have many high-quality, globally-competitive EV models available in China by 2020.

Short-term programmes that favour China's fleet-footed automakers have produced a huge burst in EV manufacturing, but can this be sustained when the vehicles have to compete worldwide against global leaders that plan vehicle production on five-year cycles?

Furthermore, the introduction of EV quotas for domestic manufacturers before they are ready with quality products could freeze foreign players out of the market in the near term, but in the long term could hold back domestic carmakers from producing higher quality EVs that could compete with those likely to emerge from the likes of GM, Ford, BMW, and Volkswagen.

Takeaway 3: A scheme with staying power that rewards a mix of vehicle and battery characteristics might be more attractive than a flat per-automaker EV quota and per-vehicle or per-kWh government subsidy.

China may also want to consider a subsidy that declines automatically as certain volume goals are reached, instead of one based on fixed dates. When subsidies expire or decline at a set date, such as on December 31, this can create an artificial boom-and-bust cycle and result in unpredictable programme costs that spiral out of control – as happened with renewable feed-in tariffs in many countries.

Takeaway 4: Schemes in which subsidies decline when volume targets are met have proven effective in California for promoting solar and energy storage, and could work for EVs in China as well.

No subsidy scheme is perfect. China's EV plan is moving rapidly and likely to contribute to scaled-up battery manufacturing and know-how and improvements to air quality and reduced oil consumption. Whether China's policies will make the country the dominant EV player worldwide remains to be seen, but I wouldn't bet against it.

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

共享单车，盛世还是疯狂？

短短一年里，共享单车的扩张改变了中国城市居民的短途出行模式，但种种监管和环境问题也随之而来。

□ 刘 琴 张 春

从北京到拉萨，共享单车已经走进中国近百座城市。这些五颜六色的共享单车装上了 GPS 定位系统，用一部智能手机扫一扫车身二维码就可开锁骑走，有些甚至还能用手机预订。

同济大学可持续发展与新型城镇化智库主任诸大建告诉中外对话，中国政府花 10 年时间倡导的公共自行车出行并没有取得显著效果，这一轮完全由私人资本主导的共享单车出行只用了短短 1 年时间就见成效，减少了小汽车出行和交通拥堵，中国有望为世界探索出一条全新的交通出行模式。

但由于资本的急剧扩张使得共享单车数量及其规模 1 年之内呈爆发式增长态势，所引发的过度投放、乱停乱放、无序侵占城市公共空间，生产环节的环境污染等一系列问题骤然显现。

绿色出行？

近期，几家共享单车公司纷纷晒出数据，宣称共享单车帮助市民实现了便捷、低碳的绿色出行。

4 月份，共享单车首创者“小红车”即摩拜（mobike）公司与智库清华同衡规划设计研究院合作，发布了市面上第一份关于共享单车影响力的报告。报告认为，共享单车出现后，在摩拜投放单车的 50 座城市中，小汽车出行占总出行量的比例下降超过 3%。在共享单车功能使用方面，北京 44% 的共享单车活跃在地铁站周边，上海则高达 51%。

报告甚至说，在不到一年的时间里，全国摩拜用户累计骑行总距离超过 25 亿多公里，相当于减少 17 万辆小汽车一年的出行碳排放。这份报告的数据来源于摩拜的用户资料和 10 万份问卷。

随后，摩拜的最大竞争对手，俗称“小黄车”的 ofo 公司和后起之秀“小蓝”单车（bluegogo）也发布了 2017 年第一季度共享单车交通数据。和摩拜的报告相似，来自 bluegogo 的报告同样显示，共享单车出现后，短途驾车明显减少。以北京为例，5 公里以下驾车出行量减少 3.8%，上海则减少 3.2%，而共享单车出行 90% 以上集中在 5 公里以内这个距离。此外，北京在共享单车上线后的拥堵程度比上线前的拥堵程度下降 7.4%，广州、深圳分别下降 4.1% 和 6.8%。这份报告的参与者包括高德地图和交通部科学研究院等权威机构。

尽管企业发布的数据可能会因为行业竞争的因素而出现夸大，但诸大建认为，减少小汽车出行这是不争的事实。他表示：“仅一年时间，自行车出行从个位数的点恢复到 10 几个点。”

世界资源研究所（WRI）中国交通项目主任刘岱宗告诉中外对话，尽管 WRI 目前还没有掌握共享单车出行数据，但大量使用共享单车在中国城市已经成为现象级的出行方式。“从马路上看到有这么多人骑共享单车就可以推断，小汽车出行肯定是在减少”。

疯狂增长

在给市民出行带来便利的同时，夹杂的是快速成长中的烦恼。取用和停放自由的共享单车正在给城市管理带来麻烦。

在深圳，多家媒体报道，清明节期间，万余辆共享单车“攻陷”深圳湾公园的海滩，观光道一路停满了共享单车。

同样的状况也发生在杭州。浙江工业大学吴伟强教授在一份研究中提出，以现在杭州四家共享单车企业的发展速度，今年年底杭州共享单车就将达到近 33 万辆，加上此前政府投放的数万辆公共自行车，以杭州 900 万的常住人口规模，到今年年底自行车就将超饱和。

在北京，据中央电视台报道，目前已有 20 多个共享单车品牌在此竞争，规模近百万辆。北京市交通委员会主任周正宇 4 月份在北京自行车日活动中说，目前北京市有 70 万辆共享单车。这对于常住人口 2000 多万的北京是否过剩还无从得知，因为共享单车的使用率数据目前还没有权威统计。北京青年报报道，北京市西城区已经禁止在该区 10 条大街上停放共享单车。

上海金融与法律研究院研究员聂日明认为，中国共享单车潮的出现，很大程度上是城市规划与交通规划的失败导致的。“政府主导的公共交通不能满足需求，才有了共享单车的流行。市场补了缺口，政府首先想到的应该是改善环境，而不应该只看到他们的乱停车、数量太多等负面影响。”

“再加上对投放共享单车的标准缺失，对投放企业缺乏门槛，导致目前出现共享单车无序发展。”刘岱宗说，“对于共享单车这一新生事物的飞速发展，政府部门肯定需要反应时间以开展相关研究对策，但是相信交通运输部通过应对网约车的政策制定过程中所积累的经验，，能够更有效地应用在共享单车的管理中来。”

同时他也认为，路权是由市民争取而来，当越来越多的人使用共享单车出行，以小汽车出行为主的城市交通管理模式也必然会发生改变。

诸大建告诉中外对话：“五颜六色过度发展的共享单车后面，是资本的的过度竞争。”有报道称，ofo 和摩拜分别已经获得 8 轮，多达 30 多亿元的融资。为占领市场份额，疯狂扩张成为共享单车公司的选择。

4 月，摩拜宣布已累计投放超过 365 万辆，单日产能超过 10 万辆，占全球自行车单日产能的 45%。

共享单车挤占深圳湾观光道

ofo 称今年年底总投放量将达到 1000 万辆。

环境隐忧

单车是零排放的出行方式。但共享单车导致的自行车产量暴增，使得生产过程中的环境问题引起关注。

环保组织公众环境研究中心（IPE）调查发现，一些共享单车生产商比如富士达，因得到 ofo 的大宗订单，生产线满负荷运转而难以兼顾环境问题，有些项目未及时更新改造废气治理设施，甚至未办理环保验收手续。而富士达是天津自行车制造行业支柱企业之一。摩拜的镁合金轮毂生产商也存在不良污染记录，比如直接向大气排放粉尘以及含有毒物质的气体。

IPE 绿色供应链项目经理丁杉杉告诉中外对话，他们在调研中发现供应商在生产过程中存在的未批先建等违规问题，“主要是由于共享单车公司急于扩张市场，需求量非常大。比如一周之内要在某个城市投放多少辆车，生产商就需要加班加点扩张生产线，而来不及上环保设施或者做环评。”

据知名国产自行车品牌飞鸽工作人员介绍，有了共享单车订单，在通常的年度生产淡季，企业的生产线却始终停不下来，还加派了人手、扩大了产能，月产量已经从 10 万台急剧增加到 40 万台。

5 月 10 日和 26 日，IPE 分别邮件致信两家共享单车品牌，提醒他们关注自行车生产环节的环境负荷，推动问题供应商做出整改和公开说明，并建立供应商环境管理体系。但丁杉杉说，截至目前，ofo 和摩拜单车尚未作出任何回复。

绿色和平的调查也发现，为节省成本，ofo 用于“智能锁”的是一次性电池，这将会对环境造成破坏。

政府：鼓励加规范

中国政府已经公开表明对共享单车的积极态度。交通运输部正在公开征求意见的一份共享单车管理办法明确指出，要鼓励互联网租赁自行车发展，提升其服务水平，让共享单车实现优化城市交通，降低交通部门碳排放的功能。但具体如何规范目前还未可知。

诸大建认为，对于共享单车所暴露出来的问题，显然不能靠企业自己解决，需要政府、企业、消费者三方合作。

他认为，在中国本土出现的共享单车开创了新的城市公共自行车模式：之前发源于欧洲的公共自行车都配有停车桩，现在中国出现的共享单车不仅是无桩、智能化的，而且是市场化提供公共服务的一种新模式。

但他也指出，北上广深等中国大城市的共享单车目前的投放规模已经接近饱和，接下去的重点应该是控制数量提高单车分享率。诸大建坦言，共享单车是新生事物，政府需要新的治理思维，但如果能够健康发展，替代小汽车出行为主导的城市交通模式，共享单车将是中国对世界的一个贡献。

中国的共享单车公司已经准备好进军国际市场。ofo 在中国、新加坡和美国已拥有 3000 多万用户。摩拜公司称，已进入国内外 50 多个城市，今年计划覆盖全球 100 个城市。

刘琴，中外对话研究员
张春，中外对话高级研究员

Bike-share schemes: Flourishing or running riot?

One year in and bike sharing apps are transforming Chinese cities, but oversight and environmental impacts are a concern

□ Liu Qin Zhang Chun

Almost one hundred Chinese cities, from Beijing to Lhasa, now have bike-sharing schemes. The bikes, clad in various colours, have GPS trackers and can be unlocked simply by scanning a barcode on the frame with your phone. Some can even be reserved via a phone app.

Zhu Dajian, director of the Sustainable Development and Urbanisation Think Tank at Tongji University, told *chinadialogue* that ten years of efforts to promote public bicycle schemes by the Chinese government had had little effect, yet these new schemes, run by private firms, have taken off in a mere year and have already reduced the number of car journeys and congestion.

China may be creating a new model of transportation that could be adopted globally.

Rapid investment has seen the number of bikes on the road rocket and spread over the course of the year. But this has also caused problems. Bikes are often parked haphazardly and infringe on urban spaces, while the manufacturing of the bikes is causing pollution.

Green travel?

Anumber of bike-sharing firms have recently published data which, they claim, shows the schemes provide urban residents with a convenient and low-carbon travel option.

In April, Mobike, known for its red livery and the first of the new bike-sharing schemes, worked with the Tsinghua Urban Planning and Design Institute to produce the first report on the impact of bike-sharing schemes.

According to that report the total number of car journeys in the 50 cities in which Mobike operates fell by 3% since the scheme launched in 2016 (in Shanghai in April and in Beijing in September). In Beijing, 44% of the company's bikes are used near subway stations; in Shanghai, the figure is 51%.

Mobike users travelled an incredible 2.5 billion kilometres in total in one year, saving the equivalent annual emissions of 170,000 cars. These figures were based on Mobike's user data and 100,000 survey responses.

Shortly afterwards Ofo, Mobike's biggest competitor (its

The arrival of bike-sharing schemes has seen congestion in Beijing drop 7.4%

bikes are yellow) and up-and-comer Bluegogo (its bikes are blue) published their travel data from the first quarter of 2017.

As with Mobike, Bluegogo's report showed a clear drop in short car journeys when its bikes became available. In Beijing, journeys of less than five kilometres fell by 3.8%, and in Shanghai by 3.2%. In fact, 90% of bike-sharing trips are less than five kilometres.

The arrival of bike-sharing schemes also saw congestion drop by 7.4% in Beijing, and by 4.1% and 6.8% in Guangzhou and Shenzhen. Contributors to the report included Gaode Maps and research from the China Academy of Transportation Science.

Although the competing companies may be overstating their data, Zhu Dajian says there is no question that the number of short car journeys has decreased.

"In just a year the percentage of bike journeys has gone from single figures to double digits," says Zhu.

Daizong Liu, China transport programme director at the World Resources Institute (WRI), told *chinadialogue* that although the WRI does not currently have data on bike sharing, the use of these bikes in Chinese cities is already at phenomenal levels.

"You can tell just by looking at the number of people riding these bikes that the number of car journeys must have fallen," he says.

Running riot

While urban residents may now find getting about the city easier, the rapid expansion has not been without problems. The bikes can be left and collected from anywhere in the city which is causing headaches for municipal authorities.

Media reports from Shenzhen told of over ten thousand bikes "invading" a beach during a recent public holiday, with an entire road taken over by parked bikes.

There have been similar scenes in Hangzhou. Wu Weiqiang, a professor at Zhejiang University of Technology, said in a research article that if the four bike-sharing firms working in Hangzhou continue to expand at current rates, they will have almost 330,000 bikes in the city by the end of year, adding to the tens of thousands already present as part of a separate government scheme.

This will mean the market in Hangzhou, which has a permanent population of nine million, will be saturated.

According to a China Central Television report there are currently twenty bike-sharing schemes competing in Beijing, with almost one million bikes.

Zhou Zhengyu, head of the city's transportation commission, said at an event marking Beijing's Bicycle Day in April that the city has 700,000 shared bikes. It is as yet unknown if this is too many for a population of 20 million, as there are no authoritative figures on how often bikes are used. According to the *Beijing Youth Daily* the Xicheng district of Beijing has banned people from leaving shared bikes on ten major roads.

Nie Riming, a researcher at the Shanghai Institute of Finance and Law, thinks that the rise of shared bikes is in large part caused by failures of urban and transportation planning.

"Government-led public transport can't meet [people's] needs, so shared bikes have become popular. The market is filling a gap, and the government should look at how to improve, rather than just worry about badly parked bikes or excessive numbers."

"There's also a lack of standards for where bikes can be left, or any barriers to entry to the market, meaning a disorderly market," said Liu Daizong. "Shared bikes have developed rapidly and the government is bound to need time to react and to research appropriate policies – but I'm sure the authorities have acquired experience through regulation of the ride-sharing sector, which will allow for more effective management of shared bikes."

Liu added that citizens have a right to choose how they use the roads, and as more and more people take to shared bikes the model of urban transportation management – currently built around cars – will inevitably change.

Zhou Dajiang told *chinadialogue* that "behind the over-expansion of the various bike-sharing schemes lies excessive competition between companies." According to one report, Ofo and Mobike have received a number of rounds of funding, with investments of up to three billion yuan. The companies are aiming to snap up market share by rapid expansion.

In April, Mobike announced it had put a total of 3.65 million bikes on the road and was manufacturing 100,000 more a day – 45% of the global total. Ofo says it will have 10 million bikes available by the end of the year.

Environmental worries

The bicycle is a zero-emission form of transport. But the sharp increase in the manufacturing of bicycles is causing environmental problems.

An environmental NGO, the Institute of Public and Environmental Affairs (IPE), has found that some makers of these bikes, such as Fuji-ta, one of Tianjin's biggest bicycle manufacturers, are getting such large orders from Ofo that they are running at full capacity and failing to take environmental issues into account.

Some facilities have failed to upgrade waste gas treatment facilities, or have failed environmental protection checks. The manufacturer of magnesium alloy wheel hubs for Mobike has a poor environmental record – it has directly released dust and toxic substances into the air.

Ding Shanshan, head of the IPE's green supply chains project, told chinadialogue that they have found breaches of rules, such as the construction of factories before approvals have been given.

"The bike-sharing companies are rushing to get market share and have a huge demand for bikes. If they want to get a certain number of bikes onto the streets of a certain city in the next week, the manufacturer has to work overtime and add extra production lines – and there's no time to install environmental equipment or carry out environmental assessments."

An employee with Flying Pigeon, a well-known Chinese bicycle brand, said that bike-sharing orders mean that production lines are working at full capacity even in traditionally quiet times of the year, with extra staff taken on and output expanded. Monthly output has risen from 100,000 bikes to 400,000.

On May 10th and 26th, IPE wrote to two bike-sharing firms, asking them to consider the environmental damage the manufacture of their bikes might be having, to encourage problematic suppliers to make improvements and offer public explanations, and to build supplier management

systems. But Ding Shanshan said neither Mobike or Ofo have responded.

A Greenpeace study found that Ofo uses disposable batteries in its smart locks, in order to save money. But this will be harmful for the environment.

Encouraging norms

The Chinese government has already expressed support for the bike-sharing sector. When soliciting opinions on rules for bike-sharing, the Ministry of Transport said that internet-based bike rental schemes are to be encouraged to develop and improve service levels, so these bikes will help improve urban transportation and reduce emissions from transportation. However, it is still unclear what actual rules will be applied.

Zhu Dajian says that the problems arising in the sector cannot be solved by the companies alone and that government, the firms and consumers need to work together.

He says that these schemes, invented in China, have created a new model for the urban public bicycle. Earlier schemes in Europe required bikes to be returned to fixed stations – but the Chinese version is smarter and bikes can be left anywhere. Also, this is a new model for market provision of public services.

But he also pointed out that the market is approaching saturation in major cities such as Beijing, Shanghai, Guangzhou and Shenzhen, the next step will be to limit bike numbers and increase frequency of use. Zhu admits that the government will need a new approach to deal with this phenomenon. But if bike sharing can grow soundly and replace an urban transportation model based around the car, the entire world will benefit from China's example.

China's bike-sharing firms are already working on international expansion. Ofo has 30 million users across China, Singapore and the US. Mobike says it is at work in over fifty cities in China and aboard, and will cover 100 around the world by the end of the year. The bike sharing revolution is already breaking out of China's cities and going global.

Liu Qin is a researcher at chinadialogue.

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共享单车：如何由“乱”向“治”

仿佛一夜之间，遍布中国城市的共享单车在改变城市交通面貌的同时，也带来了管理上的挑战，智库专家为共享单车运营企业和城市管理者支招。

□ 刘少坤 李 薇 邓 涵

2016年，随着共享经济理念的兴起，以互联网作为媒介，借助智能手机支付技术的大发展，诞生于校园中的共享单车快速进入中国各大城市。几乎是一夜之间，红黄蓝各色共享单车如同雨后春笋般，出现在大街小巷各个角落，其在数量、辐射面、影响力、使用者体验等各个方面迅速超越了其他短途交通工具。

与传统的有桩公共自行车系统相比，共享单车在技术上和运营上都有革命性的突破。共享单车系统无需设置固定的锁桩及服务终端，基于GPS、互联网、手机支付等技术，打开手机共享单车APP扫描车身二维码，即可方便地实现车辆解锁及支付功能，大大提高了系统的灵活性与便捷性。美国交通与发展政策研究所（ITDP）在天津的调查结果显示，93%的用户认可共享单车。

据猎豹全球智库统计，截止2017年4月，中国的共享单车运营企业数量已达45家，共投放自行车约720万辆。据中国最大的两家共享单车运营商公布数据显示，摩拜单车在中国超过50个城市投入运营，累计投放超过300万辆单车，最高日使用次数超过2000万，系统开通至今累计骑行次数超过6亿次；ofo单车在国内外超过70个城市投入运营，同样累计投放超过300万辆。

共享单车的爆发式增长快速释放了中国城市原本被压抑的自行车出行需求，也改善了城市的交通出行结构和大气污染排放。高德地图《2017Q1中国主要城市交通分析报告》指出，伴随着共享单车的出现，北京、上海5公里内的小汽车短距离出行明显减少，间接反映2016年共享单车在北京、上海的推广替代了部分短距离的驾车出行，降低了小汽车短距离出行的比例，一定程度减少了大气污染和能源消耗。

但共享单车数量的爆炸式增长也对原有的城市管理产生了强烈的冲击。自行车骑行基础设施的不足、管理规则的混乱和缺失使得共享单车成为各城市管理部门头疼的问题。各地政府部门也在各方面对共享单车开展了引导、规范工作，目前已有9个

> “共享自行车的使用强度、频度远高于个人自有自行车。采用已有中国国家自行车标准远远不能满足使用的需要。为保障承租人骑行安全，有必要单独制定共享自行车的产品标准。”

城市出台了相应的政策，不过现阶段各地政府对共享单车的管理均处于探索阶段，并未真正解决上述问题。

面对共享单车这一新课题，仅靠市场自我调节无法完全解决，目前急需在制度框架下完善管理政策及服务规范，界定政府、企业和使用者的责任和义务，让政府、企业及使用者各司其职，发挥所长。

目前中国流行的共享单车，本身由市场主体运营，但参与到了公共基础服务领域。共享单车所提供的出行服务具备一定的公益属性，市场作为公共服务的供给者，在提高服务质量与效率方面具有天然优势。但市场与资本也存在不可规避的缺陷。企业在提供服务的时候，为寻求商业利益，往往缺乏承担公共服务成本的动力。无序占用公共空间停放自行车便是最显而易见的问题。因此，应出台相关的指导性意见或条例，界定政府、企业及市民等三方的责任和义务：经营企业自主投放车辆并提供租赁服务，政府规范引导并提供配套基础设施支持和相应的政策保障，市民合法依规使用。

提供自行车专用设施

共享自行车在各个城市的盛行，将城市对自行车交通一直以来的不当定位突显出来，同时也体现出城市自行车专用设施的匮乏。让自行车出行成为一种安全、方便和可行的城市出行方式，提供自行车专用设施是基础。这些设施需要符合实际的自行车出行需求，合理地提供自行车存放点，如在公交站点周边，需求集中的商业区、商务区及居住区布设。这不仅可以为骑行者提供便利，也能减少因随意停放自行车造成的混乱。其次需要完善自行车道建设，安全、舒适、方便易用的自行车道也是自行车骑行的必要保证。

制定产品标准

共享自行车的使用强度、频度远高于个人自有自行车。采用已有中国国家自行车标准远远不能满足使用的需要。同时，共享自行车的使用特征有别于普通自行车的特征，也需要进行专项的技术规定。为保障承租人骑行安全，有必要单独制定共享自行车的产品标准。

更公平的支付手段

另外，人们也很容易忽略共享单车的“社会公平”维度。以摩拜单车和ofo为代表的典型共享单车使用者绝大多数是年轻用户，造成这一现象的主要原因是共享单车能够被使用的一个基本条件是可以熟练使用智能手机和APP来租还车和付费。这给中老年人群使用共享单车造成障碍。而传统的公共自行车，由于有多种支付手段，可以有效为中老年人群服务，因而使用者年龄更加均衡。这说明从提供交通工具的社会公平性方面来看，需要为居民创造多种方式的支付手段，为多数市民便捷使用共享单车奠定基础。

用数据支撑管理

作为依托现代信息技术而崛起的共享单车运营企业，应在车辆设施设备和服务管理上进行技术创新，提升共享单车服务和管理水平。例如，共享单车应配置GPS装置，为信息化管理奠定基础。这将使得“电子围栏”技术成为可能：平台可根据共享单车的GPS定位数据判断其是否停入停放区域或禁停区域，配合城市管理，有效解决共享单车乱停乱放问题。各家运营企业如果可以通过统一的监管平台实现自行车信息共享，开展大数据分析，将有助于城市管理者科学确定自行车总量规模、合理设置自行车停放区等。

共享单车的诞生及发展，顺应民众的短途出行需要。虽然短时期内爆发式增长与政策滞后及设施缺失之间的矛盾势必会诱发一系列问题，但此时却更需要科学的引导，使这一新生行业真正助力中国城市交通的绿色化。

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Time to regulate China's bike-share sector

With 7.2 million shared bikes on the road, new policies are needed to protect the public interest

□ Liu Shaokun Li Wei Deng Han

As China's sharing economy took off in 2016, shared bicycle schemes powered by internet connectivity and smartphone apps spread from university campuses to cover entire cities.

Almost overnight, millions of company bikes in red, yellow and blue spread across China's city streets and into their back alleys. These bikes rapidly overtook other forms of transport for people making short journeys.

The traditional model of bike sharing requires bikes to be returned to fixed docking stations. But the new market entrants wanted to do away with docking and service points in favour of GPS positioning and mobile payments.

Using your phone, you can see the nearest bike on a map and once you've located it, you scan a barcode on the frame to unlock it and pay. When you're done, you leave it where you want. This approach is much more flexible and convenient, allowing you to get closer to your location. An ITDP survey of 10,000 people in Tianjin found that 93% of users said shared bikes would become an essential part of public transport.

Statistics from Cheetah Global Lab, an internet research company, show that as of April 2017 there were 45 firms running bike-share schemes in China, with 7.2 million bikes on the streets. Data from China's two largest bike-share companies shows that Mobike has over three million bikes in 50 cities, which are used up to 20 million times a day, with a total of 600 million journeys made so far. Competitor Ofo also has over three million bikes in use, but across 70 cities.

This explosive growth has been fuelled by a previously unmet demand for cheap and convenient transportation over short distances, as well as a need to improve the structure of urban transport and reduce air pollution.

A report by online mapping provider Gaode into urban transport in China during the first quarter of 2017 indicated that the arrival of bike-share schemes in Beijing and Shanghai was associated with a clear drop in the number of car journeys of less than five kilometres. This would also suggest a reduction in pollution and energy consumption.

But the rocketing number of bikes has presented cities with a new set of challenges. There's a lack of infrastructure to accommodate the increasing number of

Cities need better infrastructure to ensure bikes don't pile up and cause a public menace

bike journeys, and rules for managing bike-share schemes are inadequate or absent.

Governments across China are starting to guide development of the sector, with nine cities having issued policies on shared bikes so far. However, local governments are just starting to explore the issues involved, rather than actually solve them.

Self-regulation by the market alone will not fix the problems faced by this new sector. There's an urgent need for a systematic framework of management policies and service norms.

The bike-share schemes popular in China today are operated by the market but rely on public infrastructure. The services provided are of public benefit, and the market does have inherent quality and efficiency advantages when it comes to providing public services. But there are undeniable problems with a purely market-based approach.

Companies provide services for the sake of profit and are rarely motivated to spend money to provide public services. The most obvious problem with the schemes is the inconsiderate parking of thousands of bikes. There should be policies or rules in place that define the responsibilities of companies, the government and users; whereby companies supply and rent bikes, the government provides standards and guidance, complementary infrastructure and policy safeguards, while people make use of the service.

With this in mind, here are four areas where action is needed now:

1. Providing bike infrastructure

The rise of bike-share schemes has highlighted the failure of Chinese cities to give bicycles their rightful place in urban transportation and exposed a lack of cycling infrastructure. Such infrastructure is essential if cycling is to become a safe, convenient and a practical mode of transport.

Cycling infrastructure needs to meet demand. It should include the provision of bike racks near public transport

stops and commercial, business and residential centres. This will make life easier for cyclists and reduce the number of bikes parked without consideration for others. Bike lanes are also essential to allow for safe, pleasant and convenient travel.

2. Setting product standards

Shared bikes are used far more intensively than privately owned ones but current product standards are nowhere near adequate. Specific standards are needed to ensure rider safety.

3. More accessible payment methods

It is easy to overlook the "social justice" dimension to shared bikes. Most users of bikes from companies such as Mobike and Ofo are young. In part, this is because the ability to make use of a smartphone and app to find, rent and pay for a bike is essential. But this is a barrier to use for older customers. Conventional bike rental schemes offer a range of payment methods and so are used by a wider range of age groups. To ensure fair access to public transportation, other payment options should be offered so more urban residents can make use of shared bikes.

4. Data-led management

Bike-share schemes have succeeded thanks to modern information technology. But such technology can also be used to reduce the problem of badly parked bikes. For example, shared bikes should have GPS trackers that allow for geo-fencing to determine whether the bike has been left in a permitted location.

If bike-share companies shared data across a single platform for analysis, city managers could also determine the optimum number of bikes needed, and use this data to work out where to place bike racks, and so on.

The development of shared bike schemes has met a public need for short-distance transportation. In the short term though the exponential growth, lack of relevant policy and infrastructure failings have inevitably created several problems. It's now time for considered guidance to help this emerging industry contribute to the greening of China's urban transport.

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有桩公共自行车：不怕共享单车，好戏还在后面

私营共享单车的症结到底在哪里？有桩公共自行车还能怎么进化？世界最大的公共自行车系统的负责人吴国雄有话要说。

□ 夏·洛婷

慢车道生活——远距离电动自行车道将是21世纪城市规划的核心

2017年6月13日在伦敦举行的颁奖仪式上，杭州公共自行车交通服务系统由于其对绿色能源的杰出贡献获得了顶尖国际奖项——阿什登可持续交通项目奖。

为此，我们采访了该项目负责人，杭州公共自行车交通服务发展有限公司副总经理吴国雄。他向我们介绍了为什么杭州的公共自行车项目能超过伦敦和巴黎，以及如何看待来自私营部门共享单车的竞争威胁，还有他对未来中国城市交通的展望。

中外对话（以下简称“中”）：过去三十年中国的城市设计和建设一直在努力满足私家车车主的需求。公共自行车的迅速崛起是否会引领城市规划走向一个新的方向？

吴国雄（以下简称“吴”）：如今人们把自行车视为一种低碳出行方式，并且想为改善环境尽一份自己的力量。中国政府已经把这种想法纳入考量，把慢车道（主要供自行车和电动自行车行驶）融入了城市设计。杭州和其他几个公共自行车系统较为发达的城市已经开始朝这个方向着手。

中：欧美城市也有自己的公共自行车系统，但规模和人气都赶不上杭州。自2009年建立，杭州公共自行车交通系统为什么能在短短八年内成为世界上最成功的？

吴：根本原因在于它的定位是一项公益服务。我们总骑行数的96%都是免费的，目前累计骑行次数已超过7亿次，这创造了巨大的积极的社会影响。

再看其他原因。首先，杭州市政府对这个项目的发展十分关注，包括技术方面。早在2007年，杭州市政府就到巴黎考察，吸取了很多公共自行车系统的经验。尽管我们在中国建立了第一个公共自行车系统，但并不是世界上最早的。

其次，从这个项目一开始，我们就基于杭州的城市文化进行了透彻的可行性分析。将这个项目与城市未来发展规划紧密结合，并且进行了相容性测试。

第三，这个项目从一开始就完全融入了杭州的公共交通体系，并且杭州地方政府也在政策上给予大力支持。运营模式也是它成功的一大要素。尽管项目的整体定位是公益服务，但并没有花纳税人一分钱。初始运营阶段之后，该项目便交由企业（国有的杭州公交集团）进行商业运营，这确保了其成功。

当你把一个项目交给企业，他们的最终目的肯定是利润最大化，有时就会以公共利益为代价，但杭州在这两种模式间保持了很好的平衡。

中：政府现在对这个系统还在进行补贴吗，每年能有多少盈利？

吴：政府只是在初始阶段提供了服务亭、服务点和自行车的建设费用。过去九年中，我们成功地充分利用这些资源来做广告，这是我们的一个收入来源。另外一个来源是我们入股了另一家公司，为中国其他地区（200多个城市）的公共自行车系统提供技术和服务。去年我们收入超过9千万元，足以覆盖杭州公共自行车交通系统的运营成本，还能稍有盈余。

中：最初杭州市政府为这个系统投入了多少成本，公交集团又是什么时候开始盈利的？

吴：一开始政府投入的成本有3亿元，我们从2010年开始盈利。

中:目前中国的共享单车商业应用呈爆发式增长，比如摩拜单车和ofo，而且正在走向全球。就在这个星期，摩拜单车在英国的曼彻斯特启动。私营部门共享单车模式利弊如何？

吴：私营共享单车2014年崭露头角，2015年出现了摩拜和ofo两大巨头。2016年则是爆发式增长的一年，如今市场上有30多家公司在相互竞争。

这对社会产生了巨大的影响，有一些影响是好的，但多数是坏的。共享单车造成的最明显问题是侵犯了人们的路权。当初我们开始设计公共自行车系统的时候，就确定绝不能侵犯其他人的路权。比如，我们只在宽度超过3.5米的人行道上设置回收点，通过这种方法我们能保证道路不会被堵上。但新出现的私营共享单车放在哪儿都行。

我们还看到不少私营共享单车造成交通事故的报道，特别是在那些人行道很窄的地方，胡乱停放的自行车让老人和盲人很难通行。

私营共享单车的另一个问题是扰乱了供需平衡。杭州的公共自行车系统建立前，我们进行了仔细的市场研究，得出结论说本市只要85800辆公共自行车就够了（按照每辆车每天5次的利用率来算）。但是，私营共享单车投放的车辆远远超出了市场的需要。

他们根本没有考虑社会如何利用多余的资源，而真正的共享经济决不是这样的。如果没有适当的控制，未来这将会造成社会资源的巨大浪费。我们已经看到很多城市出现了这一问题，共享单车在一些人迹罕至的地方堆积如山。

还有一个问题是押金的使用。从理论上说，用户可以随时拿回押金，但实际上很多公司将押金用于投资或者再生产。一旦它们的投资决策失败，丢掉了这些钱，这真的是一个很大的风险。

中国一些城市的政府已经开始对公共自行车（共享单车）的总量、押金的使用和安全标准进行管控，并且开始考虑这些共享单车企业通过手机软件获得的个人信息问题。

中：摩拜公司声称他们使北京的拥堵下降了7.5%。交通污染的减少能够抵销这些共享单车手机软件带来的负面社会影响吗？

吴：私营共享单车起源于那些公共自行车系统缺乏或者有限的城市。摩拜单车和ofo最早出现在北京和上海，后来拓展到广州和深圳，就是因为这些城市真的有需求，特别是在地铁站和购物中心周边。

我们不能否认这些共享单车体系在节能减排方面的贡献。但有一个问题，就是政府应该负起多大责任，把一切交给市场自身是不是一个好主意？

中：我们是不是正在目睹一个从“计划经济”模式向更加以市场为引导的方式的转型？

吴：我到北京观察了这些私营共享单车的利用情况。我认为问题在于私营共享单车没有专门的公司来监督其商业发展，并对这些自行车进行应有的维护。大多数自行车都很旧，车况很差。

我想答案应该是政府牵头建立起这个体系，然后再把它交给一家企业来运营。

中国仍然有让这些共享单车体系共存的空间。

中：政府采取了哪些措施对新的共享单车市场进行管理？

吴：根据李克强总理的指示，交通部已经发布了《关于鼓励和规范互联网租赁自行车发展的指导意见(征求意见稿)》。接下来，地方政府将把《指导意见》进一步细化为本地法规，以确保用户的权利。杭州的新法规有望在六月底出台。

中：近期还有哪些会改变中国城市交通生活的发展趋势出现？

吴：第一个趋势是地铁等“轨道交通”更大更快的发展，就像在伦敦这样。中国各地地铁发展速度非常快。第二个是公共自行车系统的规模更大、使用效率也更高，因为它们仍然是一个低碳且环境友好的出行选择。

第三，也是我们最关注的，就是将能源共享纳入公共自行车系统，让城市更加宜居。

为实现这一目标，我们正在将服务点改成新能源集散点。我们可以给自行车装上可拆卸式电池，骑行就容易多了。通过这种方式，我们可以将原本不到3公里的平均骑行距离延伸到3-10公里。

届时，自行车将不再是其他交通形式的补充，而是成为汽车和公交车的替代方式。

夏·洛婷，伦敦记者，主要关注中国及环境问题

Chinese cycle scheme wins innovation race

Public and private bike-shares are battling it out in urban spaces. Both models can coexist, says award winner

□ Charlotte Middlehurst

A Chinese city-wide bike-share has won a leading international prize for its outstanding contribution to green energy. Hangzhou Bicycle Service won the 2017 Ashden Award for Sustainable Transport at the ceremony in London on June 13.

We caught up with deputy general manager Wu Guoxiong（吴国雄）on why the scheme is outperforming those in London and Paris; the new competitive threat from the private sector; and his views on the future of urban mobility in China.

Charlotte Middlehurst(CM): For the last 30 years Chinese cities have been designed to meet the needs of car owners. Is the rapid uptake of public bike schemes pioneering a new approach to urban planning?

Wu Guoxiong (WG): These days people consider bikes a low carbon mode of transport and they want to do their fair share to improve the environment and make a contribution. In China, the government has taken this mind-set into consideration by incorporating a "slow lane" (specifically for bikes and e-bikes) into its urban design. Hangzhou is already doing this along with a few other cities where public bike schemes are well developed.

CM: Cities in Europe and the US have their own public cycle schemes but none match Hangzhou in terms of size and popularity. Since launching in 2009, why has Hangzhou Cycle become the world's most successful scheme?

WG: Fundamentally, this is due to its positioning as a public interest service. 96% of all rides made through our

> "When you give a project to a company their ultimate goal is to maximise the profit."

cycle scheme are provided for free. Our cumulative number of rides has reached over 700 million, which has created a big positive social impact.

Looking at the other reasons, first, the top government level paid a lot of attention to the project's development including the technology side. Back in 2007 the Hangzhou government visited Paris and learned a lot about cycle systems. Although we were the first in China to launch this scheme we were not the first in the world.

Second, we conducted a thorough feasibility analysis at the beginning of the project based on the culture of Hangzhou city. The project was linked to the city's future development plans and tested for compatibility.

Third, from the start it has been fully integrated into the city's public transport system. It also benefitted from policy support from the local government of Hangzhou. The business model is also a key element of its success. Although the positioning of the scheme as a public interest [intiative], it does not cost taxpayers a penny to run. [After the initial phase] the project was given to a responsible enterprise (state company the Hangzhou Public Transport Group) to run it commercially and that ensured its success.

When you give a project to a company their ultimate goal is to maximise the profit and that is sometimes at the cost of the public interest. Hangzhou made a good balance between these two models.

CM: To what extent is the government still subsidising the scheme and how much profit does it make per year?

WG: The government only provided the cost of the initial construction of the kiosks, service points and the bikes themselves. Over nine years we managed to make good use of these resources through advertising – one channel of revenue for us. The other channel of revenue is that we are a shareholder of another company that provides technology and services to other bike shares in China (in over 200 other cities). We turned over 90 million yuan (US$13.2 million) last year enough to cover the running cost of the scheme itself with a small profit left over after overheads.

CM: How much did the government put in initially and when did the company become profitable?

WG: The government put in 300 million yuan; we started turning a profit from 2010.

CM: There has been an explosion in commercial cycle apps such as Mobike and Ofo, which are going global. Just this week Mobike launched in Manchester, England. What are the pros and cons of this private sector model?

WG: Private bike sharing began to appear in 2014. In 2015 we saw two big players emerge: Mobike and Ofo. 2016 was an explosive year for private bike-share schemes. Now we see the market overrun with 30 companies all competing with each other.

It has created a big impact on society; some of it good but most of it bad. The most obvious problem it has created is the violation of people's road rights. When we started to roll out our bike scheme we had to make sure that the road rights of others were not being violated. For example, we only build collection points on pavements that are at least 3.5 metres wide. This way we can ensure that the road is not blocked. But with this new type of private share you can park anywhere.

We have seen reports of traffic accidents happening because of this, especially in areas where pavements are quite narrow. Parked bikes make it difficult for the elderly and the blind to use the road properly.

The other problem with the private schemes is that they do not create a balance between supply and demand. In Hangzhou we did very careful market research and concluded that 85,800 bikes were enough to service the city (with an average daily use of five times per bike). However, the private schemes have added a lot more bikes, far beyond the number needed.

They do not consider how to use the under-utilised resources in society which is what the real shared economy should do. Without proper controls, in the future, they will create a huge waste of social effort and resources. We are already seeing this in many cities where bikes are just

dumped in places where people don't go to.

Another problem with private schemes is the use of deposits. Users should, in theory, be able to withdraw their deposit at any time but a lot of companies use the deposit to invest or reuse it in production. It would be a real risk if companies made bad investment decisions and lost the money.

Some [local] governments in China have started putting controls in place in terms of the total number of bikes, the use of deposits and safety standards. And they have also started to think about the personal information that these companies hold through their apps.

CM: Mobike claims to have reduced congestion in Beijing by 7.4%. Do the reductions in traffic pollution outweigh the negative social impacts of these apps?

WG: The private sharing bikes schemes started in cities where there are none or very limited bike schemes. Mobike and Ofo started in Beijing and Shanghai and later moved to Guangzhou and Shenzhen because these cities have a real need, especially around metro stations and shopping malls.

We cannot deny the contribution that these schemes have made in energy savings and emissions reductions. But there is a question over how much responsibility the government should take and whether it is a good idea to allow the market to decide for itself.

CM: Are we witnessing a decisive shift away from a "planned economy" model towards a more market-led approach?

WG: I went to Beijing to observe how the private bikes are used. I think the problem there is that the private cycle schemes do not have dedicated companies to oversee the commercial development and maintain these bikes properly. Most of these bikes are old and in a very dilapidated state.

I think the answer would be for the government to take the initial lead in establishing the system before handing over to a responsible company to run and operate the scheme.

There is still space for these schemes to co-exist in China.

CM: What is the government doing to regulate this new market?

WG: Under the order of Premier Li the Ministry of Transportation has already issued guidelines on the management of hired bikes. Local governments followed by putting in place their own more detailed regulations to ensure that users' rights are safeguarded.

Hangzhou's new regulations are expected to be adopted by the end of the month.

CM: What other urban mobility trends are there that could transform life in China's cities in the near future?

WG: The first trend is the bigger and faster development of "track transport" like the subway here in London. This is happening in China where underground systems are being built rapidly. The second is the bigger and better use of public bicycle schemes because they are still a very low carbon and environmentally-friendly option.

Thirdly, which is what we are focusing on, is incorporating energy sharing within the public cycle system to make cities better places to live in.

We are doing this by making use of service points and turning them into new energy collection and distribution points. We are able to fit our bikes with detachable batteries to assist with pedalling so riding bikes will be a lot easier. In this way we can extend the original range of an average journey from under three kilometres to 3-10 kilometres.

Bikes will no longer just be a supplement to other modes of transport but become a replacement for cars and buses themselves.

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

中外对话为何再次启动野生虎生存危机系列报道?

中外对话与环境调查署建立新的合作伙伴关系，
未来将为读者带来一系列有关亚洲野生虎保护的深入报道和观点呈现。

□ 艾伦·怀特　夏·洛婷

据估计，自20世纪初以来，亚洲野生老虎的数量已经骤减96%，从10万只降至不足4000只，其中超过一半分布在印度。

去年，印度境内盗猎和非法贸易事件数量骤增，达近15年来的最高水平。一批有组织的偷猎团伙来到印度，将枪口对准了濒危的野生虎。这种现象的出现，主要是受中国对虎皮、虎骨以及其他老虎器官持续的需求刺激。

执法部门监测和拦截力度加大、巡查力度降低也是盗猎和非法贸易数量骤增的原因。此外，随着野生虎数量增加，年轻虎趋于分散、年老体弱的老虎被驱至保护区边缘，使得保护区外的老虎极易受到伤害。

在如此惨淡的背景下，2016年，仍有不少"喜讯"传来，有大量文章称，野生虎的数量正在恢复，这是一百年来野生虎种群数量首次出现增长。

然而，这些文章的观点并不全面。事实上，世界范围内野生虎仍濒临灭绝。

之所以说这些声称野生虎数量正在增加的报道会带来很大的误导，原因是多方面的。首先，很多科学家都对近年来全球野生虎数量的估算方法提出了质疑。

当前3890只野生虎的估算数字可以说是最接近合理的数字，但即便如此，仍有些人认为它也不够准确。与其说这一数字代表着老虎数量的恢复，倒不如将它看作是未来与预测值进行比较的基准。

现如今，野生虎种群数量最为稳定的地区通常是那些高度碎片化的保护区，这些保护区大多数分布在印度。与此同时，野生虎却从先前大片的栖息地消失，目前仅有7%的栖息地仍有老虎分布。

其次，自2010年起，越南、老挝及柬埔寨等国的野生虎已经"功能性灭绝"，种群繁衍能力丧失。中国野生虎仍处于灭绝的危险边缘。

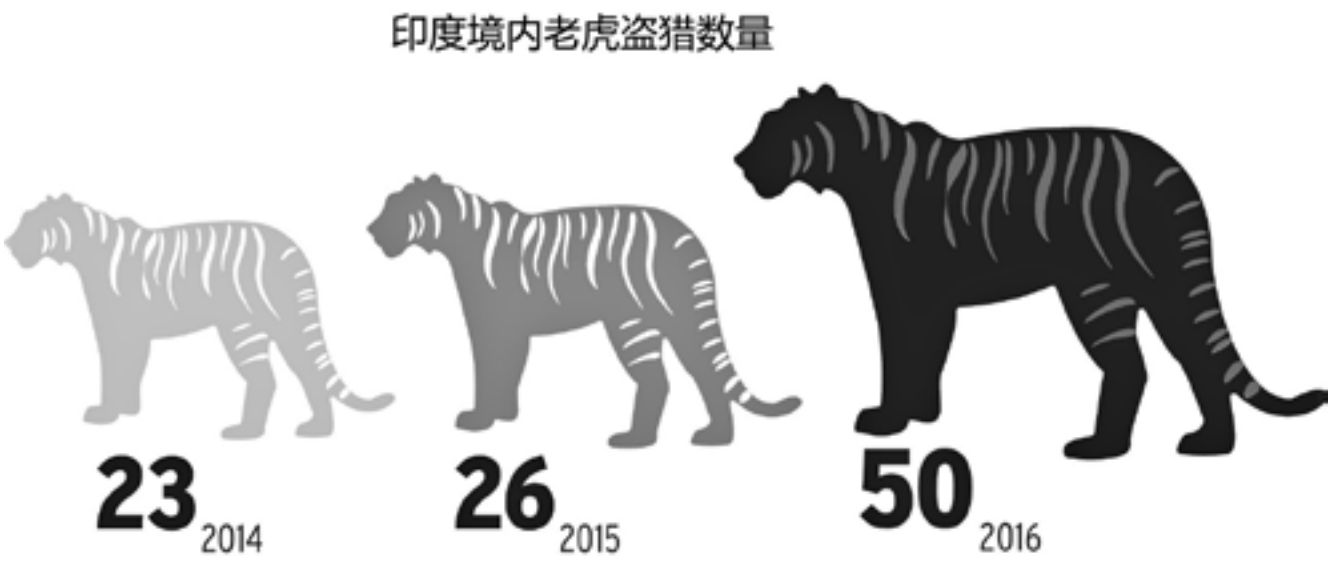
尽管某些地区隔离的野生虎种群数量呈增长趋势，但这并不能代表实质性或世界范围内的复苏。国际社会必须意识到野生虎仍处于灭绝的危机边缘，仍需要加强保护措施。

目前，野生老虎面临的最大威胁是盗猎。印度是野生虎分布数量最多的国家，2016年其境内盗猎案件数量是近15年来以来最高的一年。

走私者翻越喜马拉雅山将野生虎器官贩卖到中国等市场，以满足消费者对虎制品的需求。在中国，虎皮是奢华的家居装饰，虎骨被制成中药，虎牙和虎爪则被制成护身符和装饰品。

野生虎能够幸存，是无数森林卫士日复一日冒着生命危险克服艰险、孜孜不倦努力的结果，全世界的自然资源环保者都在支持他们的努力。

值得指出的是，在野生老虎所分布的国家中，印度的野生虎生存状态较为良好，很大程度上归功于栖息地周边社区对野生虎的宽容与敬畏，以及20世纪70年代以来印度政府高层的支持。印度法律明确禁止所有虎器官及制品贸易，并严惩非法贸易者。



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然而在很多其他国家，老虎却常常被视为一种商品。在中国，大型商业化人工圈养老虎，以及取自人工养殖虎虎皮的合法贸易，让人们对老虎器官及虎制品的渴求度和接受度居高不下，严重扰乱了执法工作。同时，消费者对野生虎制品的偏爱也助长了国内的黑市交易。在老挝、越南、缅甸的一些执法力度薄弱地区的市场上甚至公开售卖野生和人工圈养老虎的器官。

因为人们对老虎数量增长的消息信以为真，那么国际社会对老虎保护问题的重视程度就减弱了，而在这一问题上的任何摇摆都会给野生虎的生存状况带来灾难性的影响。

近年来，国际社会对大象及犀牛生存困境的不断关注已经初见成效。中国和美国这两个全球最大的象牙市场都宣布取缔国内的合法象牙市场。为保护濒临灭绝的野生虎，国际社会应给予其同等的重视，并共同采取行动。

失去野生虎意味着失去地球上最具生态价值和文化价值的珍贵物种之一。老虎处于食物链最顶端，野生虎的存在对于保护红树林、北方针叶林等自然生态系统，以及依赖这些生态系统的人类社会的健康具有重要意义。

与此同时，野生虎在亚洲文化中也具有非同一般的意义。中国绘画、文学及神话中的老虎，是野性、美好和未知的化身。失去它将不仅仅是失去一种珍贵物种，也是一种重要的文化缺失。

艾伦·怀特，环境调查署（EIA）活动人士

夏·洛婷，伦敦记者，主要关注中国及环境问题

Why chinadialogue is publishing a series on tiger conservation?

A new partnership with the Environmental Investigation Agency will bring a series of in-depth reports, opinions and articles to combat the decline of Asia's tigers

□ Aron White Charlotte Middlehurst

Reports that wild tiger numbers are on the rise are misleading

Tiger populations in Asia have plummeted by an estimated 96% since the start of the 20th century, falling from 100,000 animals to fewer than 4,000. Of those left, half are in India.

However, last year the number of poaching and trade incidents in India surged to their highest levels in 15 years as organised gangs of poachers roamed the country targeting vulnerable populations. The poachers are meeting continued demand for tiger skins, bones and other body parts primarily from China.

Other reasons for the spike include increased detection and interception efforts by law enforcement, reduced patrol efforts, and the vulnerability of tigers outside of protected areas as populations grow. This causes young tigers to disperse and sick or old ones to be pushed to the fringes of protected areas.

In 2016, a slew of "good news" articles claimed that among the doom and gloom there had been a recovery in wild tiger numbers and that for the first time in 100 years tiger populations were on the rise.

But these stories failed to capture the whole picture. In fact, wild tigers populations worldwide are still teetering on the brink of extinction.

Reports that wild tiger numbers are on the rise are misleading for a number of reasons. Firstly, scientists have questioned the methodology behind global wild tiger population estimates in recent years.

The current estimate of 3,890 tigers may be the closest we have come to a reasonable guess, and even that is considered by some to be imperfect. Rather than an indication of tiger population recovery, the figure is instead a more solid baseline for future comparisons.

Today, the most stable tiger populations are generally found in highly fragmented reserves, mostly in India. Meanwhile, wild tigers are disappearing from huge swathes of their former range. Tigers are now found in just 7% of the area they have historically occupied.

Secondly, since 2010 alone, tiger populations in Vietnam, Lao PDR and Cambodia have become "functionally extinct", with no evidence of breeding populations. In China, wild tigers remain perilously close to extinction.

While there are encouraging signs of isolated populations recovering in some places, it does not represent a substantial or widespread recovery. Far from cooling off conservation efforts, the international community must recognise that tiger populations are still in crisis.

The most immediate threat facing wild tigers is poaching. In India, home to more wild tigers than any other country, the number of tigers poached in 2016 was higher than any other year since 2001.

Wild tiger parts are smuggled over the Himalayas to feed demand in China, where their skins are used for luxury home décor, their bones are used to produce traditional medicines and their teeth and claws are turned into amulets and jewellery.

The fact that wild tigers survive at all is thanks to the tireless efforts of dedicated forest guards who put themselves in great danger every day to protect them, and the conservationists across the world that support them.

It is notable that tiger populations have remained healthiest in India, in large part due to the remarkable tolerance, and in places, reverence, among local communities living near tigers. This has been complemented by high-level political support since the 1970s, and Indian policy explicitly outlaws all trade in tiger parts and products, with strong penalties meted out to illegal traders.

But the same cannot be said for many other countries, where tigers are often treated as a commodity. Large-scale commercial farming of tigers in China, and a legal trade in skins from captive-bred tigers perpetuates the desirability for their parts and products by providing a veneer of social acceptability, and complicates enforcement efforts. Meanwhile, consumer preferences for wild tiger parts drives a parallel under-the-counter trade in China. Wild and captive bred tiger parts are sold openly in markets in Lao PDR, Vietnam and Myanmar, in areas without any meaningful law enforcement.

The assumption that tigers are being taken care of has allowed them to slip down the international community's list of priorities, and they are now languishing in the face of catastrophic ambivalence.

In recent years, sustained international attention to the plight of elephants and rhinos has begun to have an impact. China and the US, which are the world's largest markets for ivory, have announced the closure of their legal domestic ivory markets. If wild tigers are to survive in the 21st century, it is vital that tigers receive a similar degree of international attention and concerted action.

To lose wild tigers would mean losing one of Earth's most ecologically and culturally valuable species. As an apex predator, its presence is vital to ensure the health of natural ecosystems and the human communities that rely on them, from mangroves to boreal forest.

The wild tiger also holds an unparalleled significance in many Asian cultures. The majestic tiger of Chinese painting, literature and mythology is a beast of the wild that is beautiful and unknowable. To lose wild tigers would be to lose not only a crucial species of animal, but a crucial aspect of ourselves.

Aron White is a campaigner at the Environmental Investigation Agency.

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

环境调查署：商业繁育是老虎物种历史的残酷一章

环境调查署认为，很多人工老虎繁育场条件恶劣，而且商业繁育还间接加剧了野生虎盗猎的猖獗。

□ 艾伦·怀特

1986年，中国东北地区一片植被茂密的山谷中，八只老虎从运输箱中走出，踏上了这片陌生的领地。当时，这些在美国动物园出生的老虎刚刚运抵中国。按照约定，中方会以这八只老虎为基础开展一项人工繁育项目，促进物种的保护。

但实际上，这八只老虎是中国首个商业化老虎繁育场的首批“住户”。这个坐落在黑龙江省一家毛皮场内的中国横道河子猫科动物饲养繁育中心曾是一家出售药用虎骨的国营企业，现在已转为主要供游客参观的繁育中心。人工老虎繁育的兴起没有能够拯救野生虎群的衰落，反而揭开了老虎物种历史上残酷的一章。

商业老虎繁育迅速发展

20世纪80年代，在几十年的系统性捕杀之后，野生老虎基本在中国境内绝迹。随着老虎种群数量的减少，中药药用的老虎产品供应也相应枯竭。在此背景下，对虎产品的需求一方面导致老虎盗猎蔓延至其他国家，另一方面，投机者抓住这一重要的商机，兴建繁育设施来大规模人工繁育老虎，为中药行业提供虎制品原料。

30年后，中国各地繁育老虎的场所超过200处，当前圈养着5000到6000只老虎。其中一些规模很大，如哈尔滨市东北虎林园和广西桂林雄森熊虎山庄，都分别圈养了超过1000只老虎。各地还有很多规模更小的人工繁育设施，其中不乏动物园和马戏团，甚至也有私人圈养老虎。

很多圈养老虎生活在拥挤的水泥笼舍里，缺乏足够的精神刺激。恶劣的生存环境也令许多老虎在精神和身体上表现出严重的焦虑症状，而虎崽的先天性畸形则是近亲繁殖的证据。一些摄于中国动物园的视频中不乏看上去憔悴、饥饿的老虎；一些明显生病的老虎被关在狭小、肮脏的空间里；饲养人员还会使用残忍的约束手段，让游客可以付费骑着老虎照相。

野生虎的衰落

1949目前地球上还剩下不到4000只野生老虎，比20世纪初期减少了96%。中国对虎皮、虎骨和其他老虎制品的需求引发的盗猎活动是导致野生虎数量减少的主要原因。

中国圈养老虎的数量快速增长，野生老虎种群数量却继续直线下降。中国文学作品和民间传说中所描绘的曾经雄霸于中国腹地崇山峻岭之中的老虎，在经历了20世纪的漫长猎杀后，如今几乎已经很难在中国境内看见。仅剩一个小的种群在中国东北部与俄罗斯接壤的地区苟延残喘，数量估计仅为7到27只不等。

在亚洲其他地区，老虎也面临着同样的命运。越南、老挝和柬埔寨的老虎种群如今已经功能性灭绝，未发现野生虎生育的迹象。印度等一些其他国家的老虎种群数量保持

> 圈养的老虎在人类身边长大，已经失去了对人类的恐惧。如果被放归到自然环境中，它们会对当地居民造成严重的威胁，并因此注定难逃被猎杀的命运。

稳定或者有所增长，但为满足中国对老虎制品的需求而盗猎野生虎的活动仍以令人警惕的速度继续着。

显然，圈养老虎数量的激增并没有阻止对野生老虎的屠杀。相反，繁育中心的出现维持并刺激了对老虎制品的需求，导致更受虎骨消费者偏爱的野生老虎遭到毁灭性的盗猎，加速了它们的灭绝。

繁育中心：公益还是商业？

繁育中心时常见诸中国社交媒体或者新闻报端。仅在本月，横道河子猫科动物饲养繁育中心虎崽诞生的新闻和虎崽憨态可掬的照片就被广泛转载。

此类文章经常援引繁育场工作人员的说法，称这些老虎是保护性繁育计划的一部分，最终的目标是将它们放归自然。但实际上，很多繁育场中圈养的老虎被当做商品对待，繁育它们的唯一目的就是赚钱，而放归自然可行性存疑，目前尚无成功先例。

在很多养虎场，游客都可以花钱乘坐游览车进入饲养区域近距离观赏老虎，或者与虎崽或被施以镇静剂的成年老虎自拍。来自哈尔滨老虎公园的视频资料显示，老虎以不自然的“群集”方式生活。游人可以付钱给老虎喂食，也可以见证活体动物被多达 20 只老虎同时捕杀并分食的场景。而此类行为与老虎的本性相悖。

野生老虎是掠食性独居动物。虽然这些圈养的老虎有着与野生虎一样的猎杀天性，但它们并不知道应该猎杀什么。在这种环境中养大的老虎在获得自由之后会选择猎杀最容易抓到的东西，不管这东西是家畜还是人。它们在人类身边长大，已经失去了对人类的恐惧。如果被放归到自然环境中，它们会对当地居民造成严重的威胁，并因此注定难逃被猎杀的命运。

虽然印度和俄罗斯都曾人工饲养失去双亲的野生虎崽，并成功将它们放归自然环境，但中国繁育场的养殖条件与这两国的情况完全不同。

大型繁育场的冷库中都保留着大量老虎的尸体。根据 2010 年的报道，哈尔滨市东北虎林园就保存着 200 具老虎的尸体。很明显，囤积的这些老虎尸体和器官都是未来交易的存货。

虎制品贸易从未禁绝

中国很多老虎繁育场都被曝光出售老虎制品。哈尔滨市东北虎林园以及雄森熊虎山庄均多次被曝出出售虎骨酒。全国多个“动物园”也都先后被曝光存在生产和销售“虎骨酒”的行为。

政策的反复导致了老虎制品贸易从未断绝。1993 年中国政府发布通知，严禁所有虎骨贸易，并不得再以虎骨入药，但 2005 年的一份《国家林业局、卫生部、国家工商总局、国家食品药品监管局、国家中医药管理局关于试点性启用人工繁育虎骨入药和逐步减少利用豹骨的通知》（林护发 [2005]139 号）却似乎为人工繁育虎骨入药重新打开了门。2013 年，环境调查署（EIA）的报告指出，利用人工繁育老虎的皮制成的奢华地毯在获得了中国国家林业局的销售许可后上市出售。官方“认证”系统为包括虎皮在内的一些保护物种制品贸易赋予了合法性。

人工繁育间接加剧野生虎生存危机

人工繁育老虎制品的合法贸易让我们不由得不担心此类贸易对野生虎的影响。

一桩桩真实的案例证明，濒危物种的合法贸易并不能减轻野生种群面临的压力。相反，合法贸易在消费者心中留下了购买此类商品没有问题的感觉，从而刺激了需求；由于野生与养殖动物制品往往无法分辨，执法难度大大增加；此外，不法经营者可以利用合法贸易的可乘之机给盗猎获得的非法物品披上合法的外衣。

中国的合法象牙贸易很好地说明了这些问题：2004 年启动的合法象牙贸易许可证制度刺激了对象牙的需

求，导致非洲大象盗猎活动严重升级。同时，许可证的滥用也普遍存在。合法贸易体系还给盗猎象牙洗白提供了平台。

监管体系薄弱加上为确保为数不多的授权经销商的利益人为抬高市场价格，导致价格较低的非法象牙充斥黑市。非法象牙的市场比重曾一度达到 90%。中国政府最终意识到合法贸易系统以及消费者需求给野生大象种群带来的影响，并承诺在 2017 年年底之前逐步停止合法象牙贸易。

老虎制品合法贸易的许可证制度也存在诸多弊端。2012 年的一次调查中，一位虎皮商人对假扮消费者购买虎皮的 EIA 调查人员说，如果不要许可证的话，就可以给予折扣。这表明，合法产品的许可证可能被重复使用于非法虎皮的贸易。这种欺诈行为易于操作，因为许可证上的照片很小，根本无法准确地辨明其所对应的合法虎皮制品。

允许圈养野生动物制品的贸易还会催生出一个野生动物制品的平行市场，而野生动物制品由于其所谓的“功效”更受消费者追捧。2008 年一次对中国六大城市居民的问卷调查显示，大多数受访者认为野生老虎的身体器官和相关制品比圈养老虎的效果更好，更受欢迎。

近年来，东南亚地区老虎繁育活动兴起。目前泰国、老挝和越南有数百只老虎被圈养在商业繁育场。随着老虎繁育和贸易在中国和东南亚地区蔓延，非法贸易也日渐抬头。

2016 年是自 2001 年以来印度老虎盗猎数量最高的一年。中国相关政策催生的老虎制品需求正在让全球幸存的野生老虎种群付出惨重的代价。它们承受不住这样的屠杀。

中国老虎繁育场发展时间表

- **1985年：中国野生老虎种群濒临绝种**

  一家中药材公司宣布，包括虎骨在内的动植物药材面临短缺。

- **1986至1987年：中国第一家老虎繁育场开始运作**

  首座老虎繁育场成立于黑龙江，旨在解决药用虎骨短缺问题。

- **1993年：虎骨贸易被禁止**

  中国国务院禁止国内虎骨贸易，不过禁令不包括虎皮和其他衍生品。与此同时，印度、尼泊尔和俄罗斯的老虎盗猎状况加剧，来自中国的虎骨需求是因素之一。

- **1994年：国际社区呼吁各国政府终止老虎贸易**

  《濒危野生动植物种国际贸易公约》缔约国大会通过呼吁各国政府自愿禁止国内老虎贸易的决议。

- **1996至2002年：老虎繁育业扩展**

  黑龙江、辽宁、海南建立新的老虎繁育场。到2002年，中国的人工繁育老虎数量达到600只。

- **2002至2005年：中国政府认可虎骨酒**

  媒体在广西省一家酿酒厂中发现了浸泡在酒缸中的老虎骨架。

- **2005至2007年：中国人工繁育老虎数量上升一倍**

  中国的人工繁育老虎从2000只上升到5000只，超越全球野生老虎总数量。在《濒危野生动植物种国际贸易公约》缔约国大会，各国通过呼吁淘汰老虎繁育场、申明老虎繁育不该以贸易为目的的决定。

- **2016年：《野生动物保护法》经修订**

  通过许可证和标识体系，新修订的《野生动物保护法》继续支持野生动物的商业贸易。

- **2017年：中国有新的机会**

  中国即将发布允许进行商业贸易的野生动物物种清单，这是彻底禁止虎制品贸易的大好时机。

国际社会呼吁关停老虎繁育场

国际社会已经就人工繁育对野生虎生存构成的严重威胁达成高度共识。

《濒危动植物物种国际贸易公约》（CITES）禁止一切老虎及其身体器官和相关制品的商业性国际贸易，中国也于 1981 年签署了公约。CITES 还认识到一国之内合法贸易也会刺激需求并造成盗猎，并于 1994 年通过决议，呼吁各国政府禁止老虎制品的国内贸易。

后续出台的决议重申，各国应禁止国内贸易，并呼吁销毁老虎身体器官和制品的存货。老虎繁育给野生老虎种群带来的威胁已经得到重视——2007 年，CITES 缔约方会议通过决议，指出不应以老虎身体器官或者相关制品的贸易（包含国内贸易）为目的进行老虎养殖繁育。

在 2016 年 CITES 会议上老虎繁育场再次成为国际议题。在这次会议上，国际社会重申了不应以贸

易为目的进行老虎繁育的立场，就识别问题繁育场的行动方案达成一致，并鼓励销毁库存的老虎身体器官和制品。这次会议上，老挝宣布将成为首个逐步停止老虎繁育的国家。

没有需求，就没有盗猎

在全球仅存不到 4000 只野生老虎的情况下，每一只老虎都十分珍贵。2010 年在俄罗斯圣彼得堡举行的老虎峰会上，时任中国总理的温家宝在发言中提到要停止“老虎贸易”。遗憾的是，这一意愿并未得到贯彻执行，老虎商业繁育以及老虎器官和制品贸易得以继续进行。

中国领导人近期做出的关闭合法象牙市场的决定表明，中国有意愿采取必要行动，避免濒危物种灭绝。遗憾的是，到目前为止，这种意愿并未惠及老虎。

可以肯定的是，在中国，支持关闭老虎繁育场的声音日益强烈。今年全国政协全体大会上有代表提出提案，建议停止老虎制品贸易，并逐渐关闭全部老虎繁育场；中国政府新近出台的在东北地区建立东北虎和东北豹大型保护区的计划也是积极的一步。但除非老虎商业化繁育以及相关制品贸易彻底停止，否则老虎制品合法贸易的政策必将继续削弱其他拯救中国老虎的努力。

现在，中国领导层大可凭借此前象牙禁令的良好势头，出台政策禁止一切老虎商业化繁育和贸易，并逐步关闭所有老虎繁育场，在野生动物保护领域展现其真正的全球领导力。只有这样，野生老虎的生存危机才有可能得到缓解。

艾伦·怀特，环境调查署（EIA）活动人士

救助野生老虎，我可以做什么？

- 不要购买任何老虎制品，包括以圈养老虎为原料来源的制品，并转告朋友与家人不要购买此类产品。
- 如果在线上或者线下发现销售老虎身体器官或者相关制品的行为，立即向森林公安报案。
- 拒绝参观访问老虎繁育场。
- 分享本文，向朋友和家人讲述老虎繁育场对老虎造成的危害，告诉他们投资保护野生老虎的重要性。

EIA: farming tigers threatens the species

Instead of being sanctuaries for an endangered species, tiger farms are contributing to the wild tiger's march towards extinction

□ Aron White

In a thickly forested mountain valley in north-east China in 1986, eight tigers emerged from transport containers to find themselves in new and unfamiliar territory. Born in American zoos, these tigers had recently been shipped to China on the understanding that they would form the basis of a new captive breeding programme, to benefit the conservation of the species.

In the name of "conservation" China's tiger farms have fuelled the sale and consumption of tiger parts, encouraging the destruction of the species

Instead, they were to become the founding population of China's first commercial tiger farm. They had been brought together by the Ministry of Forestry at a fur farm in Heilongjiang province to establish the Hengdaohezi Breeding Centre, founded as a government-funded operation to breed tigers for profit and supply bones for medicinal use. It has since been implicated in trade in tiger products, and also functions as a tourist attraction. The move marked the beginning of a cruel chapter in the history of their species, which was to have a devastating impact on tigers across the world.

The growth of China's tiger farms

By the 1980s, after decades of systematic persecution, wild tigers were almost extinct in China. This also caused a decline in the supply of wild tiger body parts within China for use in traditional medicines. As continued demand in China fuelled a poaching epidemic across other tiger range countries, government and private profiteers seized upon a business opportunity: large-scale breeding of tigers in captive facilities to supply body parts to the traditional medicine industry. From the outset, the tigers in China's tiger farms were commodities, to be slaughtered and sold off for profit.

Fast-forward three decades. There are now 5,000-6,000 tigers kept in more than 200 facilities across China. Among these are large scale farming operations, including the Harbin Siberian Tiger Park, and Xiongsen Bear and Tiger Mountain Village in Guangxi each of which now hold more than 1,000 tigers. Captive tigers are also kept in smaller facilities across the country, from "zoos" and circuses to backyard enclosures.

Many of these tigers are kept in horrific conditions, in cramped concrete enclosures without any kind of mental stimulation. Many captive tigers exhibit symptoms of severe mental and physical distress, and genetic deformities suggest serious in-breeding. Recent footage from Chinese zoos and other facilities has revealed emaciated, starving tigers; obviously sick tigers in tiny, squalid enclosures; and the use of cruel restraining techniques to allow paying customers to pose for photos sat atop a tiger.

China's missing tigers

There are fewer than 4,000 wild tigers left on Earth – a decline of 96% since the start of the 20th century. The main reason for this decline is poaching to feed Chinese demand for their skins, bones and other body parts.

As the number of captive tigers in China has skyrocketed, wild populations have been in freefall. The tiger of Chinese literature and legend, that once prowled the hills and valleys at the heart of the country, has never recovered from the slaughter of the 20th century when wild tigers almost entirely disappeared from China. A tiny population clings on in the remote north-east of the country, along the Russian border, with numbers ranging from seven to 27 animals.

Elsewhere in Asia, tigers have followed a similar trajectory. Populations in Vietnam, Laos and Cambodia are now functionally extinct, with no evidence of breeding. While tiger populations are stable or increasing in some other countries, such as India, the poaching of wild tigers to feed Chinese demand for their body parts continues at an alarming rate.

Clearly, an explosion in the number of captive tigers has done nothing to stop the killing of wild tigers. Instead, the tiger farming industry has sustained and stimulated demand for tiger parts, driving devastating poaching of wild tigers, which are preferred among consumers of bone, and hastening their march to extinction.

Tiger farming is not conservation

China's tiger farms make frequent appearances on social media and in the news. Just this month, the announcement of tiger births at Hengdaohezi Breeding Centre was widely shared, accompanied by beguiling images of the young animals.

Often included in these articles are claims from staff at the facilities that the tigers are part of a conservation breeding scheme, with the aim of releasing tigers into the wild. In truth, the animals held in these places are treated as commodities, kept for the sole purpose of making money. Not one tiger bred in a tiger farm has ever been released into the wild.

At many facilities in China, visitors can pay to get close to tigers by taking bus "safaris" through enclosures or posing for selfies with tiger cubs or sedated adults. Videos from Harbin Tiger Park show tigers living in unnatural "herds". Visitors can pay to feed the animals and can witness live animals being killed and devoured by as many as 20 tigers at once. There is nothing natural about such behaviour.

Wild tigers are solitary creatures that depend on their

> A huge number of tiger carcasses are kept in freezers at large-scale facilities.

hunting skills to survive. While these captive tigers may share the inherent ability to kill as their wild brethren, they have not learned the skills of what to kill. Tigers that have been raised in these environments will kill whatever is quickest and easiest upon release, be that livestock or people. Growing up around people, they lose their fear of humans. They would pose a serious danger to local communities if released, and would be condemned to a life of persecution.

The conditions under which tigers are raised in these facilities are completely different from the conditions under which orphaned wild tigers have been prepared for successful releases in India and Russia.

A huge number of tiger carcasses are kept in freezers at large-scale facilities including Harbin Siberian Tiger Park, where 200 carcasses were reported to be kept in a freezer in 2010. Stockpiling of tiger carcasses and body parts in freezers is a clear indication that these stocks are being kept for trade in the future.

Trade in captive tiger body parts

Many facilities that keep captive tigers in China have been exposed trading products made from tiger parts. The Harbin Siberian Tiger Park and Xiongsen Bear and Tiger Village have both been documented on multiple occasions trading "wine" made by soaking tiger bones in alcohol. Production and trade of this "tiger bone wine" has also been documented at various "zoos" around the country.

The Chinese government is apparently complicit in perpetuating the tiger trade. Despite a 1993 directive, which prohibits all trade in tiger bone and its use in medicine, tiger bone wine appears to be produced and marketed with express government authorisation under a 2005 Notification. In 2013, the Environmental Investigation Agency reported on the commercial sale of luxury rugs made from the skins of captive-bred tigers, which were being offered for sale with permits issued by the State Forestry Administration. The skins are being sold under an official "labelling" system which permits legal trade in products made from protected species.

A parallel legal trade in products made using captive tiger body parts raises serious concerns about the impact of such trade on wild tigers.

Multiple real-world examples have shown that in practice, legal trade in threatened species does not take pressure off wild populations. Conversely, legal trade stimulates demand by legitimising the product in the eye of the consumer; complicates law enforcement as products from wild and captive animals are often indistinguishable; and presents opportunities for traders to launder illegal items from poached animals into the legal trade.

China's legal ivory trade is a perfect example emphasising these concerns: the launch of a legal, permit-based ivory trade in 2004 stimulated demand for ivory, triggering a huge escalation of elephant poaching in Africa and widespread abuse of the permit system. The legal trade created a system that enabled the laundering of poached ivory.

The weak control systems and the deliberate inflation of market prices to ensure profit for the limited number of authorised dealers created a market that was undercut by cheaper illegally sourced ivory. At one point up to 90% of the ivory on the market was illegal. The government of China recognised the role the legal trade system and demand was having on wild elephant populations, and committed to phasing out its legal ivory trade by the end of 2017.

The permit system used in legal trade of tiger products is also wide open to abuse. During an investigation in 2012, a tiger skin trader offered EIA investigators a discount if they purchased a skin without the accompanying permit, suggesting that the permit could be fraudulently re-used for other, illegally sourced skins. This could be pulled off easily, as the image on the permit was too small to accurately identify the skin it related to.

Enabling trade in captive-bred wildlife also risks creating a parallel market for wild-sourced products, which may be seen as more desirable and effective. In a survey of residents of six major Chinese cities in 2008, a majority of people believed that parts and products from wild tigers are more effective and more desirable than those from farmed tigers.

Recent years have witnessed the emergence of tiger farming across Southeast Asia. Hundreds of captive tigers are now held in commercial breeding facilities in Thailand, Lao PDR and Vietnam. As tiger farming and trade in captive tigers has proliferated in China and Southeast Asia, so too has illegal trade.

2016 saw more tigers poached in India than any year since 2001. The world's last remaining wild tiger populations are paying the ultimate price to feed demand that is stimulated by Chinese policy. They simply cannot withstand this level of killing.

International calls to phase out tiger farms

Tiger farming has been recognised as a serious threat to the survival of wild tigers by the international community at the very highest levels.

All international commercial trade in tigers and their parts and products is banned by the Convention on International Trade in Endangered Species of Flora and Fauna (CITES), an international treaty that China signed in 1981. Recognising that legal domestic trade within a country also stimulates demand and drives poaching, CITES passed a resolution in 1994 that called for governments to ban domestic trade in tiger products.

Subsequent decisions have reiterated that countries should ban domestic trade, and have called for the destruction of stockpiles of tiger parts and products. The threat posed to wild tigers by tiger farming has been specifically recognised; in 2007, the CITES Conference of the Parties passed a decision that tigers should not be bred for trade (including domestic trade) in their parts and products.

Tiger farms were back on the global agenda at the 2016 CITES meeting, at which the international community reiterated that tigers should not be bred for trade, agreed on a plan of action to identify problem facilities, and encouraged the destruction of stocks of tiger parts. At this meeting, Lao PDR announced that it would be the first country to phase out its tiger farms.

End demand to end poaching

With less than 4,000 tigers remaining in the wild, every single tiger counts. In 2010 at a Tiger Summit held in St Petersburg, Russia, then-Premier Wen Jiabao made a statement that mentioned ending "tiger trade". Unfortunately, this intent has not been taken up by the State Forestry Administration, which has continued to allow and promote commercial breeding of tigers and trade in their parts and products.

With the recent closure of its legal ivory market, the Chinese leadership has shown they are willing to take the action required to save a species threatened by trade from extinction. Sadly, this willingness has not yet been extended to tigers.

It's clear that there is growing support for ending tiger farming in China. A proposal was put forward at this year's CPPCC plenary session to end tiger trade and phase out tiger farms, and new government plans to establish a huge reserve in north-east China for tigers and leopards are a positive step. But until commercial breeding and trade of tigers and their parts are phased out, this policy will continue to undermine any other attempts to save China's tigers.

The Chinese leadership now has an opportunity to build on the momentum of the ivory ban and show real global leadership in wildlife conservation, by banning all commercial breeding and trade of tigers and phasing out tiger farms. Until they do so, wild tigers across Asia are living on borrowed time.

Aron White is a campaigner at the Environmental Investigation Agency.

寻找“马堵山水怪”

云南深山里的一面湖水，成为了寻找世界上最后一只野生中华巨鳖的最佳机会。

□ 史蒂文·G·普拉特

世界上仅存的一只平塔岛象龟（Pinta Island Giant Tortoise）“孤独的乔治”离世后，全球最濒临灭绝的龟鳖类动物这一“殊荣”便轮到了斑鳖 (Rafetus swinhoei)（中华巨鳖）的头上。

《国家地理》杂志对这一物种的描述如下：斑鳖是世界上最大的淡水龟鳖类动物，身长可以超过 50 厘米（最大的壳有 86 厘米）。其背壳光滑，呈橄榄绿色，长着一张非常搞笑的面孔，眼睛很小，吻部突出。

在栖息地被人类居所侵占并面临灭绝之前，斑鳖已经生活了千万年。根据中国古籍记载，长江斑鳖曾经在太湖里很常见，那里的人们将其视为祥瑞的象征。尽管它们的数量不断减少，但在中国的民俗中仍然拥有特殊地位，其独特之处让它们成为国民性的吉祥物，因此其灭绝也更加令人扼腕。

虽然过去颇为常见，但由于栖息地退化、以及人们对斑鳖成体和幼体的捕捉和鳖卵的捡拾，斑鳖种群数量逐年减少。但直到十年之前，人们才开始关注这个问题。如今，这个物种只剩下 3 个成员：苏州动物园的一对老年个体（分别为 90 岁和 110 岁）以及越南一座水库里的孤零零的一只“光龟儿”（可能是雄性）。

人们一直千方百计让苏州动物园的这对斑鳖繁殖，但迄今都不成功。雌鳖每年都产下约 100 枚卵，却没有一个能够孵化。问题似乎在于雄鳖，多年前它与另一只雄性争斗的时候生殖器和背壳都受到了永久性的损伤，无法让配偶受精。

2015 年和 2016 年，人们曾尝试利用从雄鳖身上采集的精子对雌鳖进行人工授精，但都徒然无效。2017 年 4 月中旬再次进行尝试，但结果要到几周之后才能见分晓。

苏州动物园内世界上硕果仅存的三只斑鳖之一

显而易见的解决办法就是把越南的那只雄鳖带到中国与苏州的雌鳖交配，但这个办法被证明过于复杂而且风险太大，无法实施。

但这个似乎已经被判了死刑的物种还有一线希望，尽管非常微弱。据当地渔民说，云南马堵山水库（红河上的一段蓄水河道）可能还有一只或者两只斑鳖。

这个水库形成于2007年，被截流的50公里河道被视为野生斑鳖最后的据点。蓄水后不久，当地渔民就开始报告看到一只不同寻常的大鳖。

通常情况下，渔民偶遇这只大鳖时，它都是在偏僻河湾岸边沐浴着春日暖阳。凡是有幸目击这一幕的人，毫无例外地把大鳖描述成一只体型巨大、形貌苍古的爬行动物。尽管我们知道全世界的渔民都免不了习惯性地夸张描述，但至少可能有一只长到很大的斑鳖在马堵山水库还有一线生机。

对于保护专家和黄山学院、中科院昆明动物研究所这些学术机构来说，这是迄今听到的最好消息，从2011年以来，他们一直在进行野外考察，寻找第四只斑鳖。

遗憾的是，一只孑然独栖的个体并不能对它的种群有任何贡献，从生物学的角度来说，如果不能参与繁殖，那么这个个体即便活着，也和死了没什么两样了。事实上，斑鳖已经被动物学家们冠上了“僵尸物种”的绰号，以形容那些仅仅剩下一个或者几个寿命很长的个体（“活着的死者”），但因为无法产生后代而不可避免地走向灭绝的种群。

2016年，国家地理空气与水保护基金和国际野生生物保护协会中国项目请我帮助寻找这种极端珍稀和难以捕捉的鳖类。马堵山水库很大，在里面寻找一只（或两只）鳖无异于大海捞针。我把这次任务比作寻找尼斯湖怪，这种据说生活在尼斯湖深水中的水生爬行动物迄今也没有出现在科学探测的视野之内。考虑到二者探测活动之间显见的相似性，我们很快就开始把这个神秘的大家伙称为“马堵山水怪”。

斑鳖大多数时间都在水里度过，偶尔才会出水晒太阳，而产卵则更为罕见。要确保“生命的证据”，获得一只或两只斑鳖在这个水库里生活的铁证，希望似乎极为渺茫。

我们最有希望的策略就是在岸边来回巡逻，用双筒望远镜目不转睛地盯着水面和岸上斑鳖可能会去晒壳的地方，期待能捕捉到斑鳖的惊鸿一瞥。我们也设立了饵料站，把新鲜鱼肉用绳子挂住，就漂在水面上。

差不多两个月中，我们的三人团队日复一日、无论风雨地在水库边走来走去，偶尔停下来搜寻斑鳖的蛛丝马迹，随时准备拍摄，但结果毫无所获。

2017年4月，我们再次来到马堵山水库，在中科院昆明动物研究所饶定齐教授的帮助下，继续寻找斑鳖的工作。我们用能搞到的最臭气熏天的东西当诱饵：鱼内脏、整鱼、鸡、猪肝、羊肝、牛肾。对我们来说，这些玩意泡在水里腐烂太恶心了，但对一只饥饿的鳖来说，可是真正让它开心吃到撑的自助大餐。

但和2016年一样，我们今年的工作仍然毫无成果。尽管三个星期里我们想尽办法，还是没能看到一只斑鳖。

是否还要继续寻找“马堵山水怪”？现在我们进退两难。保护费用一向都很紧缺，对于斑鳖这样希望渺茫的物种来说更是如此。

但是，它们面临的风险却越来越大：仅存的能配对的两只斑鳖繁殖成功的希望不大，无可否认斑鳖这个物种正无法止步地滑向灭绝深渊。亟不可待的局势需要亟不可待的手段来挽回，我们不能放弃任何捉到“马堵山水怪”，并将它用于繁育的努力。

斑鳖的命运，一个国之符号的存亡，可能很大程度上取决于“马堵山水怪”能否被安然捕获。尽管时局非常不利，但就像NASA的口号所说：“永不言败。”

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The hunt for the Madushan Monster

Funding is needed to support the search for the last of the world's giant turtles

□ Steven G Platt

With the death of Lonesome George, the sole surviving Pinta Island Giant Tortoise, the Chinese Giant Softshell Turtle (rafetus swinhoei) now has the dubious honour of being ranked as the world's most critically endangered species of turtle.

The Giant Softshell Turtle is noted for being the largest freshwater turtle in the world. They can grow larger than 50 centimetres, and the largest shell found measured 86 centimetres. The carapaces are smooth and olive green and the turtles have quizzical faces with small eyes and a pointed snout.

This species predates by thousands of years the human settlements that now threaten its extinction. According to ancient books and records in China, the Yangtze Giant Softshell Turtle was once common in Lake Tai, in southeast China, where it was worshiped as a holy icon representing merits and blessings. Despite declining numbers, they have continued to have a special place in Chinese folklore. Their uniqueness has made them a national icon and their extinction even more deplorable.

Although apparently common in the past, populations of the Giant Softshell Turtle have steadily declined over the years as a result of habitat degradation, the harvesting of adults and young turtles, and egg collecting. This dramatic population decline apparently went largely unnoticed until about 10 years ago. Now only three Giant Softshell Turtles are known to survive: an aged pair (90 and 110 years-old) at the Suzhou Zoo and a solitary individual (probably a male) inhabiting a reservoir in Vietnam.

Efforts to breed the turtles at the Suzhou Zoo have been unsuccessful; every year the female lays about 100 eggs, but none has ever proved fertile. The problem seems to lie with the male whose penis and shell suffered extensive damage during combat with a rival male many years ago. This left him permanently impaired and unable to inseminate his mate.

Artificial insemination of the female using sperm from the male was attempted in 2015 and again in 2016 to no avail. In mid-April 2017, the procedure was tried once more, although the outcome will not be known for several more weeks.

The obvious solution to this reproductive dilemma is to bring the male from Vietnam to China and allow him to fertilise the female in Suzhou Zoo. This has proven too complicated and risky to realise though.

But there is a glimmer of hope, albeit a faint one, in this otherwise bleak conservation prognosis. According to local fishermen one or possibly two Giant Softshell Turtles inhabit Madushan Reservoir, an impounded stretch of the Red River in Yunnan province, southeastern China.

Dr. Steven G. Platt is keeping watch of a section of the Madushan Reservoir

The reservoir filled in 2007, inundating a 50-kilometre section of river that was considered the last stronghold of these giant turtles in the wild. Local fishermen soon began to report sightings of an unusually large turtle.

These were usually chance encounters made when fishermen stumbled upon a giant turtle basking in the warm spring sun along the shore of isolated coves. Without exception, those privileged to view the turtle describe an ancient-looking reptile of colossal size. Even taking into consideration the tendency of fishermen the world-over to exaggerate, it seems likely that at least one very large Giant Softshell Turtle remains in Madushan Reservoir.

So far this is the best news for conservation experts and academic institutions, including Huangshan University and Kunming Institute of Zoology, that have conducted field investigations looking for a fourth turtle since 2011.

Unfortunately, from a biological standpoint, with no opportunities for reproduction, this lone survivor is as good as dead. Indeed, the Giant Softshell Turtle has been described by zoologists as a zombie species, a moniker applied to populations consisting of one or a few long-lived individuals ("the living dead") and ultimately doomed to extinction because of continued lack of reproductive success.

In 2016, with support from the National Geographic Air and Water Conservation Fund, Wildlife Conservation Society-China Program asked me to assist in the search for this extremely rare and elusive turtle. The reservoir is vast

> "Securing hard evidence that one or more Giant Softshell Turtles remained alive in the reservoir seemed like a long shot."

and searching for one turtle (or maybe two) was a daunting undertaking with no guarantee of success. I likened our task to the search for the Loch Ness monster, a prehistoric marine reptile reputed to inhabit a deep lake in Scotland that has so far eluded scientific scrutiny. Given the obvious similarities between these efforts, we soon began referring to our cryptic quarry as the Madushan Monster.

Softshell turtles spend most of their time submerged; only rarely do they leave the water to bask and even more rarely, to lay eggs. Securing hard evidence that one or more Giant Softshell Turtles remained alive in the reservoir seemed like a long shot.

Our most promising strategy was simply to foot patrol the shoreline, continually scanning the water's surface and potential basking sites with binoculars in hopes of catching a glimpse of the turtle. We also established bait stations – fresh fish suspended on a rope, held just at the surface.

Day after day for almost two months, regardless of the weather, our team of three walked up and down the reservoir, pausing occasionally to scan for any sign of the turtle, camera at ready. But no turtle was found.

In April 2017 we returned to the reservoir and resumed our search with support from professor Rao Dingqi, from Kunming Institute of Zoology at the Chinese Academy of Sciences. This year we upgraded the baits and used the most rank-smelling "fishmeal" available, including fish entrails and pig livers, repugnant to us but a veritable smorgasbord to a hungry soft shell turtle.

Unfortunately, as in 2016, our efforts were met with disappointment despite three weeks of intensive searching.

Our dilemma now is whether to continue searching for the Madushan Monster. Funding for conservation is always scarce, and for a forlorn species like the Giant Softshell Turtle, even more so.

But the stakes are incredibly high: with the single surviving pair seemingly unable to reproduce, there is no denying the Giant Softshell Turtle is on an irrevocable slide towards extinction. Desperate situations call for desperate measures and no effort should be spared to capture the Madushan Monster and use this animal for breeding purposes.

与当地渔民交谈了解情况

A WCS staff is interviewing a local villager about her sightings of a giant turtle

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当地渔民辨认龟鳖

A local fisherwoman is comparing the appearance of a turtle she has seen with pictures of the Chinese Giant Softshell Turtle

© Gao Chang / WCS

The fate of the Giant Softshell Turtle – a national icon – could very well hinge on capturing the Madushan Monster. While recognising the odds against success are high, as NASA's motto reads, "Failure is not an option".

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当地渔民帮忙架设饵站

A local fisherwoman helps to set up baits to lure the Chinese Giant Softshell Turtle

© Gao Chang / WCS

在马堵山水库放置饵料，
以增加捕获繁殖用斑鳖的概率

Baits were deployed at the Madushan Reservoir to increase the chance of capturing a Giant Softshell Turtle for breeding

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水库旁的工地

Construction work is going on around the Madushan Reservoir

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“一带一路”倡议为何重要

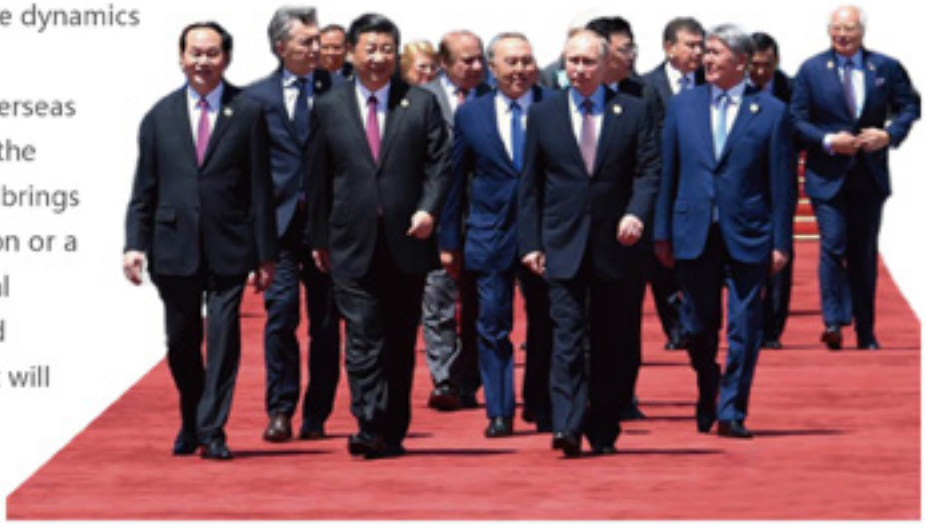
Why BRI is important

2013 年，习近平主席首次提出“一带一路”倡议，希望借此进一步推动海外开发。按照规划，中国将向沿线 60 多个国家投资大约 4 万亿美元。中国希望通过“一带一路”规划开启更具包容性的“全球化 2.0 时代”，打造一种能够深刻改变现有全球治理的新体系。

但开发本身也会带来多重环境隐忧，对沿线国家的环境而言是福还是祸，能否开创中国领导全球资源管理和可持续发展的新时代，都将取决于中国如何真正科学地落实“一带一路”倡议。

Alongside China's explosive domestic growth, the country has long been making headlines for its investments and development in countries from Latin America to Africa. The Belt and Road Initiative (BRI) , launched by President Xi in 2013, plans to further this overseas development push, funnelling approximately US$ 4 trillion to over 60 countries. Through this initiative China is poised to launch "globalisation 2.0" , and establish new institutions that could profoundly shift the dynamics of global governance.

Chinese development overseas could pose concerns for the environment. Whether it brings environmental devastation or a new era of Chinese global resource stewardship and sustainable development will depend heavily on how China approaches the Belt and Road Initiative.



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