




中外对话

chinadialogue



中国能否实现 煤电“软着陆”

How is China's
energy revolution going

大气污染治理加速中国供暖能源革命
Coal heating shortens lives

什么导致了2017年“气荒”
What caused China's squeeze on natural gas

水污染治理重创珍珠养殖户
Pearl farmers hit hard pollution clean-up



总编 伊莎贝尔·希尔顿

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

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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。

“中外对话”的主要业务是其独特的完全双语网站，它通过发表精辟、原创的中外文章、评论和分析，促进世界理解中国崛起带来的全球性生态环境影响，进而共同寻求公平可行的全球环境问题解决之道。

“中外对话”在很多机构的资助下运作，其中包括英国环境、食品和农业事物部、壳牌(中国)以及许多基金会。

关于“中外对话”内部交流刊物及网站

《中外对话》内部交流刊物是“中外对话”网站文章的精华。我们从网站上精心挑选了趣味盎然而极富挑战性的深度报道以及展现科技进步的新闻信息，方便与您的交流。欲阅读更多精彩的文章，请您登陆“中外对话”网站 (<http://www.chinadialogue.org.cn>)。

“中外对话”网站以中国前沿环境记者撰写的文章、对国际知名人士的访谈以及对全球重大问题的深入报道为主要内容，通过网站，您可参阅每日全球环境新闻、赏析高质量的文章和参与“零语言障碍”的讨论(双语发布)。

另外，通过全球双语志愿者的帮助，您还可以在线与英文读者顺畅进行跨文化交流。在那里，您可以提出疑问、挑战专家观点、贡献您的知识和了解他人独到的见解。

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chinadialogue is an independent, not-for-profit organisation based in London, Beijing, Delhi and Sao Paulo.

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.

About our journal

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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帝国寻羊记：日本侵华的环境影响

傅·肖里和马斯
25.04.2017

Read in English

时至今日，内蒙古草原上的毡房依然带着日伪时代留下的基因，继·克里斯马斯写道：



上世纪三十年代日本军国主义实验场筑起了内蒙古的草原毡房。图片来源：elton

村上春树1982年发表的小说《寻羊冒险记》常使读者走上了一段寻羊之旅，也许一只羊上有皇朝印记的吉祥。随着上世纪30年代日本大举入侵中国，这头羊也从草原深处中苏醒，试图找到一个完美的人类宿主，完成自己统治世界的大业。它首先在蒙古边境拉拢了一位日本科学家的心腹，这位科学家正在1932年成立的伪满洲国发展畜牧项目。一年后，羊的宿主又从农业专家变成了一个战犯，这个战犯后来成了东蒙一个右翼满洲的老大。



2017年中外对话十大热读文章

1. 文化：帝国寻羊记：日本侵华的环境影响
2. 特别报道：实地探访：揭秘中巴经济走廊重镇瓜达尔港
3. 共享单车：盛世还是疯狂？
4. 中国2017年空气质量目标能否实现？
5. 中国参与“一带一路”煤电项目的利与弊
6. 绿色企业200强中国独占鳌头
7. 储能技术能加速中国可再生能源发展吗？
8. 中国能源“十三五”再度调高低碳目标
9. 专家：三江源国家公园面临环境挑战
10. 中拉经济合作：谈钱不简单

实地探访：揭秘中巴经济走廊重镇瓜达尔港

在肖里·傅·肖里
16.06.2017

Read in English

估值400亿美元的瓜达尔港是否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？在穆塔·肖里·傅·肖里进行了探访。



瓜达尔港在巴基斯坦丰富的中头以及中巴和南在地区的门户。图片来源：Shahid Ahmad

在巴基斯坦的瓜达尔港，一间被说不尽的传说，一条从未停止躺在一片红色的土地上。港口里，几只小船随着海浪的起伏上下浮动，海水清澈见底，还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-paan”的甜饮料，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。

中国2017年空气质量目标能否实现？

傅·肖里
26.01.2017

Read in English

从数字看中国基本能够实现五年前的承诺，但维持在空气质量向好的边缘，还离更为根本的转型，还有距离。



2015年12月，北京的PM2.5水平连续4天超过900微克/立方米，引发了对雾霾治理和工业的临时限制。图片来源：Wu Hao

中国政府2013年颁布的《大气污染防治行动计划》（简称“大气十条”）已经进入最后一年的冲刺。明年此时，全中国人都将知道政府有没有实现五年前的承诺。

总体达标问题不大

共享单车：盛世还是疯狂？

刘昊
包磊
09.06.2017

Read in English

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



北京共享单车上线的初期使用量比上顶峰时下降74%。图片来源：shichao

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上装了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行，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潘大建告诉中外对话，中国政府花10年时间推动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年时间就完成，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出行模式。

The 10 most-read articles of 2017

1. Culture: An imperial sheep chase
2. Special report: What's happening at Pakistan's Gwadar port?
3. Bike-sharing schemes flourishing or running riot?
4. Can China meet its 2017 air quality goals?
5. Chinese Belt and Road Initiative still pushing coal
6. China dominates top 200 clean tech companies list
7. China turns to energy storage to push renewables
8. China raises its low-carbon ambitions in new 2020 targets
9. Interview: Source of Mekong, Yellow and Yangtze rivers drying up
10. Latin America's oil dependent states struggling to repay Chinese debts

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大气污染治理加速中国供暖能源革命

燃煤集中供暖带来的空气污染令中国北方居民平均寿命受损，如何才能获得没有雾霾的温暖？

□ 冯 灏

几乎每年冬天，南北供暖政策的差异都会成为中国民众热议的话题。

到 20 世纪 50 年代，时任国务院总理周恩来提出以秦岭、淮河一线（一月 0℃ 等温线）为界划分南北，此线以北为北方集中供暖区，由政府提供集中供暖设施、并保证高额补贴甚至免费的煤炭供应；而此线以南不实行集中供暖。

“淮河政策”延续至今，已经超过半个世纪。数以亿计的北方城市居民享受了稳定且可负担的供暖服务，南方居民则只能采用空调、电取暖器、电热毯等手段过冬，并且没有补贴。有没有暖气，甚至影响了

一些中国人对工作城市的选择。

不过，根据《美国国家科学院院刊》近日公布的一项研究，享受了温暖冬天的北方居民同时也为此付出了沉重的健康代价。

“淮河政策”的健康代价

该研究指出，由于几十年来大规模烧煤供暖，造成空气污染、引发健康问题，生活在集中供暖区的北方居民平均预期寿命要比南方减少 3.1 年。

这份研究由来自美国、以色列和中国香港等地的研究人员合作完成，定量分析了可吸入颗粒物浓度与预期

寿命之间的关系，而研究的变量正是中国供暖“淮河政策”的南北差异。

研究人员从中国全国疾病监测系统抽取了 2004 年到 2012 年的死因调查数据，并结合从八十年代至今中国的空气污染数据进行分析。研究证实了“淮河政策”对 PM10（直径比 PM2.5 大的细颗粒物）浓度、预期寿命的巨大影响。分析指出，常年暴露于 PM10 之下，居民平均寿命明显缩短、患心肺系统疾病的可能极大提高。

根据研究，从淮河南岸到北岸，空气污染有一个陡然的增加。具体而言，在供暖补贴政策的影响下，相比淮河以南，淮河以北局部地区

PM10 浓度要高 41.7 微克 / 立方米, 人均寿命缩短了 3.1 年, 心脑血管病死亡率增加了 37%。

供暖能源革命陡然加速

研究作者之一、香港科技大学助理教授何国俊表示, 研究绝不是批评供暖政策本身, 更不是进一步说应该取消集中供暖。

这份研究并没有提出具体的政策建议。但何表示, 近年来, 很多地区进行了“煤改气”、“煤改电”等措施降低供暖期的空气污染, 这些都是积极的改变, 长期来看, 这些改变将带来巨大的健康改善和福利改进。

“供暖和空气污染并不是非此即彼的关系。”何国俊强调。

事实上, 在工业部门的停产限产等行政手段已经快要用到极致后, 在 2013-2017 年大气污染治理目标的压力下, 中国政府的控煤行动已经在以前所未有的速度向燃煤供暖部门进发。

今年九月, 住房和城乡建设部、国家发展改革委、财政部和国家能源局向 13 个省级政府发布了《关于推进北方采暖地区城镇清洁供暖的指导意见》, 要求各地从这个冬天起就“加快燃煤供暖清洁化, 因地制宜推进天然气、电供暖”。

由于煤改电需要改造居民住房取暖终端设备, 部分地区还需升级

“在工业部门的停产限产等行政手段已经快要用到极致后, 在 2013-2017 年大气污染治理目标的压力下, 中国政府的控煤行动已经在以前所未有的速度向燃煤供暖部门进发。”

电网, 此轮改造主要以煤改气方式进行。目前, 北京中心城区供暖已经于 11 月 5 日实现全面燃气化, 每年可减少燃煤 920 万吨。河北、山西、山东、河南、陕西等地也在加班加点改造燃煤供热厂。

根据《中国环境报》, 同等重量的天然气燃烧过程排放的颗粒物和氮氧化物都要比燃煤低 90% 左右。在抢先完成煤改气改造的北京, 今年 11 月的 PM2.5 和 PM10 日均浓度分别比去年同期下降 55% 和 46%。

但另一方面, 供暖部门能源革命的陡然加速也给能源供应带来了压力。据《中国电力报》报道, 中国今年的天然气消费量预计比去年的 1982 亿立方米上涨多达 17%。据新华社报道, 河北、山西、山东、河南、陕西等省已经出现气荒和天然气价格疯涨。一些业界人士对中国的天然气自产和进口量能否承受煤改气的规模提出了质疑。

按照政府远期计划, 到 2030 年中国天然气消费量将从目前的每年 1982 亿立方米升至 6000 亿立方米, 其中一半将依赖进口。

能源基金会北京办事处总裁邹骥 11 月 29 日在一个大气污染治理主题研讨会上则表示, 从各国的历史经验来看, 天然气还是一个必经的阶段, 中国若选择超越它, 会非常艰难。

环保部官员刘友宾在一场新闻发布会上也表示, “煤改气”经过专家反复论证, 是非常重要的项大气治理措施。

以煤炭为主的能源结构是造成大气污染很重要的原因, 为了做好大气污染防治, 不断调整能源结构是必须选择的一条途径, 刘友宾强调。

冯灏, 中外对话研究员

Coal heating shortens lives

Lives in northern China are shorter than in the south because of air pollution from heating

□ Feng Hao

Each year, the winter chill creates a rift between China's north and south based on radically different policies when it comes to heating, and with consequences for air pollution and life expectancy.

In the 1950s, premier Zhou Enlai drew a line across the country following the River Huai and the Qinling mountains. North of the line, temperatures in January fall below zero degrees whereas in the south temperatures remain above freezing. This difference led the government to provide district heating in the north, which relies on centralised coal-fired boilers to provide free or heavily subsidised heat. In the south, no district heating was provided.

Over half a century later this system remains in place. It means that hundreds of millions of residents in northern

China enjoy reliable and affordable heating, while those in the south depend on air conditioning units, electric heaters, and blankets to make it through winter – and get no subsidies. For some people, the provision of heating is a consideration when choosing where to live.

But northerners are paying for their warmer winters with their health, according to research published in *Proceedings of the National Academy of Sciences*.

The toll

According to the study, burning coal to power district heating produces air pollution that is harmful to human health, with the average life expectancy in the north 3.1 years shorter than in the south.

The research was carried out jointly by academics from the US, Israel and Hong Kong and involved a quantitative analysis of the link between life expectancy and inhalation of particulate matter – with the north-south difference in heating policy the variable studied.

The researchers looked at the causes of death regionally

“
Northerners are paying for their warmer winters with their health.
”



© Nick McIntosh

In Beijing, the switch from coal to gas heating has reduced levels of tiny particles (PM2.5 and PM10) in November by 55% and 46% on last year

from 2004 to 2012, recorded in China's national disease monitoring database. They then analysed it in combination with air pollution data going back to the 1980s.

They found that local heating policies have a major impact on the levels of tiny particles (PM10) in the air. Long-term exposure to PM10 increases the incidence of heart and respiratory diseases and reduces expected lifespan.

The research found a steep increase in air pollution moving from the south of the country to the north. People in areas that benefit from heating subsidies see PM10 levels raised by 41.7 micrograms per cubic metre, on average. This contributes to a reduction in lifespan of 3.1 years and a 37% greater incidence of death from heart disease and stroke.

Energy reform heats up

He Guojun, assistant professor at Hong Kong University of Science and Technology and one of the report authors, says

the research is not a criticism of the heating policy itself, nor is it calling for it to be abolished.

The paper does not offer any specific policy suggestions. But He Guojun said that to reduce air pollution many cities have switched to using natural gas or electricity to power homes and other buildings instead of burning coal. This approach can deliver enormous long-term health and welfare benefits.

"It's not the case that you have to choose between heating and clean air," he stressed.

The government has been working to reform heating provision in recent years, in line with wider efforts to curb air pollution from industry. The implementation of the 2013-2017 Air Pollution Action Plan means that some factory operations are either stopped or restricted during peak pollution months.

In September, the Ministry of Housing and Urban Rural Development, the National Development and Reform

Commission, the Ministry of Finance and the National Energy Administration published guidance on cleaner heating provision for 13 provincial-level governments. It required changes by winter, including the preferential use of electricity or natural gas over coal, according to local availability.

A switch to electric heating in homes requires new heaters to be installed, and in some cases upgrades to the electricity grid. This is costly and complicated so most changes have seen natural gas used to replace coal-fired heating instead.

In 2017, almost all heating provision in central Beijing was gas-powered. This switch has saved 9.2 million tonnes of coal being burned, according to official sources. Hebei, Shanxi, Shandong, Henan and Shaanxi provinces are also working to switch from coal to gas as quickly as possible.

According to a report from China Environmental News, natural gas produces 90% less particulate matter and nitrogen oxides compared to the same weight of coal. In Beijing – China's first city to switch from coal to gas heating – PM2.5 and PM10 levels for November are down 55% and 46%, respectively, from last year.

However, these rapid changes have put pressure on energy supplies. According to the same report, last year's consumption of 198.2 billion cubic metres of natural gas

is expected to rise 17% this year. News platform *Xinhua* reported that Hebei, Shanxi, Shandong, Henan and Shaanxi provinces have all seen natural gas shortages and price spikes this year.

The rapid switch in fuel has led some industry insiders to question whether domestic production and imports of natural gas can grow quickly enough to meet demand.

Already, the Ministry of Environmental Protection was forced to lift a ban on coal-fuelled heating systems in areas that are yet to transition or had inadequate supplies of natural gas but which were left without heating in freezing temperatures.

Zou Ji, president of the Energy Foundation's Beijing office, said at a seminar on air pollution on November 29 that experiences in other countries showed a reliance on natural gas is inevitable, and that it would be extremely difficult for China to avoid this.

Liu Youbing, an official at the Ministry of Environmental Protection, told a press conference that the switch from coal to gas had proved an effective way of reducing air pollution.

A coal-dominated energy mix is a major cause of China's air pollution, Liu added, stressing that ongoing reforms were essential to tackling air pollution. ☺

Feng Hao is a researcher at chinadialogue.

中国能否实现煤电“软着陆”？

中国煤电行业面临严峻的金融风险，但明智的政策调控能够带来煤电的成功“软着陆”。

□ 奥利弗·萨特

煤炭问题成为上个月在德国波恩举行的联合国气候峰会主要议题之一。在2017年全球煤炭消费极可能止跌反弹的背景下，淘汰煤炭的紧迫性引发了广泛讨论。

包括英国、荷兰、意大利、法国、加拿大、芬兰和墨西哥在内的27个国家作出新承诺，要在2030年前完全淘汰煤电。这一承诺固然令人受到鼓舞，但问题是，上述国家仅占全球动力煤消费总量的3%。全球还需采取更多行动。

中国政府最近也宣布了一系列限制煤炭消耗的措施。根据中国在巴黎协定下提交的国家自主贡献，到2030年，中国要将非化石燃料能



为避免国民经济遭受重大动荡，中国必须实现煤电行业软着陆

源占一次能源消费比重提高到 20%。中国电力行业“十三五”规划也将煤电产能规模严控在 1100 吉瓦以内。最近，中国还出台了多项措施，收紧不必要的新增投资。

但从长期来看，为确保全球升温不超过 2 摄氏度，中国还必须减少煤炭消费，侧重发展清洁能源。现在的问题是：中国如何才能在这一过程中，同时保证国民经济、以及密切依赖政府补贴的庞大煤电行业不遭受重大动荡？换句话说，中国如何实现煤电行业的“软着陆”？

过于拥挤的煤电行业

最近，我与他人合著了一份研究报告，力求解答上述问题。我们审阅了中国 2005 年以来建造的每座煤电站的财务表现，包括历史利润率和产能数据等，以此计算煤电站过去的净收入。然后，我们再将这些数据与投资成本数据相结合，并且考虑了几种不同气候政策情景对煤电厂经营状况的影响，最终计算出了不同情景下煤电站的投资回报和搁浅资产规模。

这项分析研究得出的一项结论触目惊心：中国煤电站已经面临极高的资产搁浅风险。搁浅资产是指那些在设备设计使用周期内无法收回成本的资产。

国家自主贡献型情景(基于当前政策背景)显示，2005 年以来，中国煤电站累计投资总额为 3.3 万亿元人民币，而煤电站的净现值很可能已经转为负值，为 -920 亿元人民币。其中原因是，近期出现新增产能投资泡沫、电力需求速度增长放缓、煤电须为其他低碳发电让路，从而造成煤电站负荷小时数不断下降。

除非采取行动，否则今后随着市场自由化的推进和碳排放交易市场的建立，煤电站的利润率还可能进一步降低，行业发展前景越发不妙。

尽管如此，在更为激进的气候政策下，中国政府如果能够对煤电行业采取有效管理措施，那么煤电投资者仍有可能大幅降低自己的亏损几率和程度。

例如，除了全面叫停所有新建和在建煤电站，如果中国政府还能规定所有煤电机组在运营达 30 年后必须退役，那么这将使全国煤电站的净现值从 -920 亿元人民币提高至 -130 亿元人民币。原因是淘汰已获得投资回报的老旧电站，有利于提高市场存留的后建电站的负荷小时数。

煤电行业风险可控

好消息是，我们的研究同时表明，即使在最糟糕的情景下，宏观经济风

险对整个金融行业仅会造成微弱影响。除非其他行业广泛出现大规模违约和投资减值，否则电力行业资产不会造成系统性金融问题。

为管理煤电行业的资产搁浅风险，我们在研究报告中重点提出了几种解决办法。首先，电力公司必须落实中央政府已经宣布的政策，冻结所有新建煤电项目，包括已经开工在建项目。只有这样才有可能遏制风险。

其二，政府可帮助后建煤电站提高运营灵活性，鼓励其平衡传统发电和不断增加的可再生能源发电比重，从而获得收益。该措施可帮助煤电站更快地获得部分投资回报。

此外，对运营时间超过 30 年的老旧电站实施规范淘汰。中国许多煤电站由国有企业负责运营，这种独特的所有制结构为实施该战略提供了潜在机遇。在适当的激励措施下，煤电站可降低资本成本，从而接受经济生命周期的缩短。

总之，中国煤电行业的投资者与欧洲、印度、美国等地的同行面临着同样难题：不仅要规范管理低碳新技术的引进，还要规范管理煤电等低碳技术的淘汰。☞

奥利弗·萨特，可持续发展与国际关系研究所 (IDDRI) 研究员

How is China's energy revolution going

China's coal power plants are set for serious financial losses but action now could turn things around

□ Oliver Sartor

At the recent international climate summit in Bonn, Germany, coal was one of the main topics of conversation. In particular, people discussed the urgent need for parties to the Paris Agreement to strengthen their efforts to phase down coal use, amid new evidence that coal use and emissions will rise once again in 2017.

These efforts were given a small boost when 27 governments announced a new commitment to phase coal out of their power sectors by 2030. Nonetheless, these countries, which include the UK, Netherlands, Italy, France, Canada, Finland, and Mexico, only make up around 3% of global coal power consumption. More action is needed globally.

For its part, China's government has made recent announcements that could help to limit its coal use. Its

Nationally Determined Contribution (NDC) to the Paris Agreement, which sets out China's actions to address climate change, will increase the share of non-fossil fuel sources to 20% of primary energy by 2030. It's 13th Five-year Plan for electricity also caps total coal-fired power at a maximum of 1,100 gigawatts of capacity. And there have been recent attempts to control unnecessary new investment.

In the longer term, keeping global temperature rises below 2C will require a decrease in coal consumption in China in favour of cleaner energy sources. The question is how will China achieve this without derailing its economy, or cause a panic in its gigantic coal power sector which is already dependant on government perks to offset falling profit margins. Can China pull off a soft landing for its coal sector?

“ A more radical coal phase-out scenario that sees the government manage the transition away from coal would lead to significantly smaller financial risks. ”

An overcrowded sector

In a recent research paper, my co-authors and I attempted to provide an answer to this question. We reviewed the financial performance of each coal-fired power plant in China built since 2005 to estimate their past net revenues. We combined this with data on investment costs and then developed projections for future revenues under several different climate policy scenarios.

A striking result from this analysis is that the risk of stranded assets in China's coal fired power fleet is already very high. Stranded assets are unable to recover their investment costs as intended over their technical lifetime.

Our business-as-usual scenario, where China sticks to its current climate commitments and energy policy without making additional efforts, showed the 3.3 trillion yuan (US\$500 billion) invested in China's coal power fleet since 2005 is set for a deficit. In fact, the cumulative net present value of these investments is probably negative, at -92 billion yuan (US\$-14 billion).

The reason is declining load factors for coal plant because of a recent investment bubble in new capacity and an overall slowing in the rate of electricity demand growth. It's also the case that coal power is making way for other low-carbon sources of electricity.

Unless action is taken, the outlook for coal is likely to worsen as the electricity market is opened up to greater market competition and a carbon market is introduced, with the effect that profit margins for coal power could fall even further.

The business-as-usual scenario paints a grim picture for coal power but a more radical coal phase-out scenario that sees the government manage the transition away from coal would lead to significantly smaller financial risks for power sector investors. In addition to a full moratorium on all new and under construction coal power plant, a rule that all plant must retire after 30 years of operation would bring the net present value estimate from -92 to -13 billion yuan (US\$-2 billion). This is because the phasing out of old plants, which have already earned back their investment costs, would increase the capacity factors of the newer coal power that remains in the market.

Manageable risks

Fortunately, our analysis also suggests that the macro-economic risks to the financial sector as a whole are small. Even under a worst-case scenario, power sector assets alone are unlikely to pose a systemic financial problem unless they are part of a larger scale wave of defaults and investment write-downs.

To manage the risk of stranded assets from coal-fired power, our study also highlights several options that are available to the authorities. The bottom line is that China must follow through with what the central government has already announced, which is to freeze all additional coal-power plant, including those already under construction. This will help to contain the problem.

Secondly, the government could also help newer coal plant to operate with greater flexibility, meaning it could be remunerated for balancing the growing shares of intermittent renewable power such as solar PV and wind. This could help it earn back some of the investment more quickly.

Implementing a managed phase out plan for older power plant – say, those with at least 30 years of operations, would also be helpful. Many of China's coal plants are run by state-owned enterprises so with the right incentives, their lower capital costs could help them to accept a shorter economic life-span.

Overall, the equation facing investors in China's coal-power sector is the same as in other countries in Europe, India, the United States, and elsewhere: it is not enough to manage the phase in of new low-carbon technologies, more attention is needed to managing the phase out of carbon intensive technologies, such as coal. ☞

Oliver Sartor is a researcher at Institute for Sustainable Development and International Relations (IDDR).

什么导致了 2017 年“气荒”？

在煤改气的社会争端渐渐平息后，如何填补天然气短缺成为中国接下来的挑战？

□ 李婧

今年北京的空气质量已经有了明显的改善，但大张旗鼓地禁止燃煤取暖，并大力推行煤改气的做法在 12 月初遭遇困境。成千上万的农村居民因为天然气严重短缺而挨冻。据估计，整个冬季采暖季期间，北方地区和全国的天然气缺口分别在 48 亿和 113 亿立方米左右。

有报道称，河北某小学的学生被迫在室外学习，靠晒太阳取暖。而在另一篇报道中，山西的建筑工人因烧煤取暖而被拘留。

这些新闻引发了社会热议。煤改气这项旨在帮助中国降低温室气体排放和净化空气的政策究竟是对

还是错，问题究竟是出在了政策本身还是执行上？

失算的大手笔

中国环境规划院副研究员雷宇在采访中表示，逐步淘汰中国北方农村家庭使用的污染严重的低质散煤这项决策是中国工程院在对

《2013—2017 年清洁空气行动计划》进行中期评估时提出的。

评估结果还指出，如果要达到 2017 年的 PM2.5 目标，北京“仍需要付出更大的努力”。2016 年 7 月发布的这份文件建议：“增加京津冀地区的天然气供应，以天然气或电力取代工业用煤和民用散煤。”

2016 年 9 月，环保部与北京、

煤改气大幅增加了天然气的需求，并且也暴露出供暖改造过程中存在的问题。国家发展和改革委员会的一位官员说，一部分问题是地方官员盲目从众。



为改善取暖季空气质量，中国大力推进以气代煤、以电代煤工程

天津、河北等地政府联合发布文件，加大对空气污染的控制力度，要求北京市的丰台、通州、房山和大兴四个区、以及河北省保定市和廊坊市的部分地区积极推进“电代煤”和“气代煤”工作。

但截至2016年底，北京市的PM2.5空气指数为每立方米73微克($\mu\text{g}/\text{m}^3$)，仍远高于 $60\mu\text{g}/\text{m}^3$ 的年均目标，且距离落实《大气污染防治行动计划》的目标仅剩一年的时间。这是2017年调整目标、加大执行力度的原因之一。

3月份，煤改气的步伐加快，几个部委和省市政府联合发文敦促“2+26”个城市(包括北京、天津和河北、山西、河南等省的26个城市)采取清洁供暖措施。每个城市都设

定目标，到10月底前完成5-10万户以气代煤、以电代煤工程。

8月份，目标再次升级。环保部发布文件要求，“2+26”城市应在十月底前完成至少三百万户升级改造。这比3月份设置的280万户目标上限还要高。

该政策的确在降低空气污染方面见到了实效。因冬季雾霾而饱受诟病的北京，今年前11个月的PM2.5平均水平下降到 $58\mu\text{g}/\text{m}^3$ ，低于 $60\mu\text{g}/\text{m}^3$ 的目标，但仍高于世界卫生组织设定的 $10\mu\text{g}/\text{m}^3$ 的标准。北京市附近的天津和河北省大部分城市预计也将实现预定目标。

地方政府积极推进清洁取暖改造工程。山东和辽宁两省都制定了

清洁取暖系统改造计划，据说河北省的项目完成情况比原计划高出了30%。

雷宇在接受财新传媒的采访时估计，有400多万户家庭进行了散煤取暖改造。根据地方政府公布的数据，大多数地方政府选择了天然气供暖，而没有选电力供暖，这可能是因为前者成本较低。此外，电力供暖改造将给电力基础设施带来额外的压力。北京称，郊区已有超过一百万户家庭改为电力取暖，城市电网的高峰负荷增加了约10%。

然而，“煤改气”大幅增加了天然气的需求，并且也暴露出供暖改造过程中存在的问题。国家发展和改革委员会的一位官员说，一部分问题是地方官员盲目从众。这让他们在实现目

标的过程中不考虑全国的影响。

清洁供暖系统改造时，有一些地方官员在新的供暖系统还没有就位的情况下就贸然拆除现有的系统。无怪那些没有合适采暖设施的农村居民要怨声载道了。

加州大学洛杉矶分校法学院研究中国环境治理的助理教授亚历克斯·王（Alex Wang）表示，这种运动式的空气治理行动的一个负面风险就是“地方政府在大张旗鼓地完成政治目标、落实政策的过程中会采用不当、甚至是粗暴的方式。”

天然气是否是明智之选？

之后，迫于天然气供应的压力，环保部不得不松口放宽了限制，允许改造没有完工的地区继续使用燃煤供暖。

虽然地方各级政府和主要天然气供应企业正努力建设天然气基础设施，确保民用气的供应，但也有人提出，对于中国这样一个煤炭储备丰富，而国内天然气和石油资源有限的国家来讲，天然气是否是明智之选？

中国工程院院士、清华大学热能工程学院教授倪维斗是支持煤炭主导中国能源消费的主要倡导者之一，他主张让其他形式的替代能源发挥“辅助作用”。他认为应通过“清洁煤”技术继续提高煤炭效率。

他在最近一次公开演讲中说：“山西和内蒙古的千亿吨煤炭储备是保障国家能源消费的根本。

中国工程院院士杜祥琬对此持反对意见。他表示，中国走低碳发展道路的决心就“预示着煤炭的衰落”。

虽然取代农村散煤对减少空气污染至关重要，但由于中国天然气

储量有限、进口不足，各地区单纯依靠天然气取暖是不切实际的。

“北京的（天然气）供应有保障是因为它是首都，但其他地区不可能效仿。还应提倡使用其他替代能源，如回收工业废热和地热供暖。这就要求当地政府根据当地情况寻找最佳解决方案，”他表示。

厦门大学中国能源经济研究中心主任林伯强说，改用天然气在短期内仍然是改善空气质量的“正确选择”。

他说：“从全球角度看，天然气供应依然充足，并且在2020年之前都可能保持这种态势。”

天然气占中国能源供应总量的7%左右。今年冬天的供应严重短缺是因为政策驱动的需求增加，且短时间内供应难以跟上，特别是经历了几年的天然气市场需求低迷之后。

“三大国有石油巨头（指中石油、中石化、中海油三家主要天然气供应企业）和一些行业智库认为，今年的增长率不会达到15%至16%。他们也被需求骤增吓了一跳。2017年中左右他们终于感觉到这个变化时，已经为时过晚，”林伯强解释说。

据惠誉国际评级公司估计，中国的天然气供应短缺只是暂时的。随着冬季供暖需求的减少，短缺状况将会得到缓解，而进口的增加和储运基础设施的改善将会平稳解决未来几年的季节性短缺问题。

页岩气的潜力

除了根据短期变化做出调整，并且推动能源市场改革，使天然气定价可以更好地反映需求之外，林伯强还建议中国应扶植新兴页岩气产业的发展，以确保中长期供应。

他表示，美国的经验表明，大举投资页岩气有助于促进研发、专业技术知识积累和大幅降低成本，从而保障了美国的能源安全，扩大了出口。

据国土资源部介绍，中国的页岩气储量达21.8万亿立方米，其中技术可采储量1220亿立方米。然而，环境研究人员警告说，储量主要集中在干旱地区，水力压裂开发需要大量的水资源，这可能会进一步加剧水资源短缺状况。

美国页岩气行业由于甲烷泄漏和地下水污染遭到了环保组织的强烈反对，而中国的情况则不同。迄今为止，中国压裂行业面临的主要挑战是地质问题。中国的页岩气储量分布比美国更加分散，且埋藏深度大，技术挑战更大。能源研究咨询公司伍德麦肯兹表示，尽管如此，中国最大的两家运营商——中国石油天然气集团公司和中国石化集团开展“压裂作业的信心日益增强”。

国土资源部7月份表示，中国已成为世界第三大页岩气生产国，2016年产量较上年增长了76.3%，达79亿立方米。为实现2020年300亿立方米的年产量目标，中国须快速提高产量。^⑤

李婧，自由撰稿人，关注环境与气候议题。

What caused China's squeeze on natural gas?

A programme to ban coal heating and switch to gas left households in the cold. What happened?

□ Li Jing

Air quality has improved significantly in Beijing this year but an overzealous programme to ban coal heating and switch to gas ran into trouble earlier in December. Severe shortages of natural gas – estimates vary from 4.8 billion to 11.3 billion cubic metres – left thousands of rural people shuddering in the cold.

This included students in a Hebei primary school who were forced to study outdoors in the sunshine to keep warm. And in another report, construction workers in Shanxi were detained for burning coal to keep warm.

These stories have sparked a debate over whether the coal-to-gas switch is a case of a good policy that's been poorly implemented, or the wrong approach to helping China reduce its greenhouse gas emissions and clean-up its air.

Runaway ambition

The decision to gradually phase out the burning of low-quality and polluting loose coal in rural homes in northern China was recommended by the Chinese Academy of

Engineering in its mid-term review of the “2013-2017 national action plan” to clean up air pollution, according to an interview with Lei Yu of the Chinese Academy for Environmental Planning.

The review concluded that Beijing “needs greater efforts” if it was to meet the 2017 PM2.5 target. The document, dated July 2016, recommended: “Increasing natural gas supply in Beijing-Tianjin-Hebei area and replacing industrial coal use and domestic loose coal burning with natural gas or electricity.”

In September 2016, the Ministry of Environmental Protection, jointly issued a policy document with the governments of Beijing, Tianjin and Hebei, to intensify air pollution control measures. It urged Beijing's four southern districts – Fengtai, Tongzhou, Fangshan and Daxing – and parts of Baoding and Langfang in Hebei province to replace loose coal heating with gas or electricity.

But at the end of 2016, Beijing's PM2.5 levels were 73 microgrammes per cubic metre ($\mu\text{g}/\text{m}^3$), still much higher than the annual mean target of 60 $\mu\text{g}/\text{m}^3$ and with only one

year left. This is one explanation for why the goals were revised in 2017 to substantially increase ambition.

Efforts to replace coal with gas were accelerated in March when several ministries and provincial governments jointly issued a document urging the “2+26 cities” (this includes Beijing, Tianjin and 26 other cities in Hebei, Shanxi and Henan provinces) to adopt “clean heating”. Each city was set a target to replace coal stoves in 50,000 to 100,000 homes with gas boilers or electric heaters by the end of October.

In August, the target was upgraded again. The Ministry of Environmental Protection issued a document that the “2+26 cities” should finish retrofitting at least three million homes by the end of October. This was even higher than the 2.8 million homes at the upper limit of the March target.

Even before targets were revised, efforts to reduce air pollution had paid off. In Beijing, which is notorious for its winter smog, average levels of tiny particles known as PM2.5 dropped in the first eleven months to 58 µg/m³, below the 60 µg/m³ target, although still much higher than the World Health Organisation’s guideline of 10 µg/m³. Neighbouring Tianjin and most of the cities in Hebei province are also expected to meet the target.

Local governments have pursued the heating switch enthusiastically. Both Shandong and Liaoning provinces developed plans for retrofitting clean heating systems. In Hebei province, achievement was said to be 30% higher than the original plan.

In interviews with Caixin media, Lei Yu estimated that over four million homes were retrofitted in the switch from coal. Most local governments opted for gas over electricity, according to figures published by local governments, likely due to lower costs. Also, electric heating retrofits would put additional pressure on power infrastructure. Beijing said over one million homes in suburbs shifted to electricity for heating, which has increased the maximum load on the city’s power grid by about 10%.

However, the shift to natural gas has greatly enhanced demand, and exposed problems with how the heating switch has been implemented. An official at the National Development and Reform Commission said part of the problem is that local level officials exhibit a “sheep-flock”

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The shift to natural gas has greatly enhanced demand.
”

mentality. This can lead them to deliver on targets without consideration of nationwide impacts.

In replacing coal stoves with cleaner heating systems, there are also cases where local officials have arbitrarily demolished existing systems without first securing new sources of heating. Needless to say, rural villagers left without proper heating have complained.

Alex Wang, an assistant professor at UCLA School of Law, who researches China’s environmental governance said one downside of such campaign-style clean-up efforts is the risk that “policies are implemented in inappropriate, even abusive, ways as local governments clamour to meet political targets.”

Is natural gas the right choice?

The squeeze on natural gas supplies has since forced the Ministry of Environmental Protection to backtrack on its ambitious targets, allowing coal burning in areas where retrofitting work is incomplete.

While local governments and major gas operators in the country are scrambling to build out gas infrastructure and secure supplies for household use, some are asking whether gas is the answer given China’s extensive coal reserves and limited domestic gas and oil resource.

Ni Weidou, a member of the Chinese Academy of Engineering, and professor of thermal engineering at Tsinghua University, is one of the leading proponents of allowing coal to dominate China’s energy consumption, leaving cleaner alternatives to play an “auxiliary role”. Ni said China should continue to improve coal efficiency through “clean coal” technologies.

“The hundred-billion tonnes of coal reserve in Shanxi and Inner Mongolia are the fundamental guarantees of

energy consumption for the country,” he said in a recent public speech.

Du Xiangwan, also a member of the Chinese Academy of Engineering, disagrees. He said China’s determination to take on a low-carbon development path has “foretold the demise of coal”.

While replacing loose coal in rural areas is critical to reducing air pollution, it is unrealistic for all regions to solely rely on natural gas for heating due to China’s limited reserves and limited imports.

“Beijing’s [gas] supply is secured because it is capital city, but it is impossible for all other areas to follow suit. Other alternatives, such as recovering industrial waste heat and tapping geothermal heating, should also be encouraged. This requires local governments to find the best solutions based on local conditions,” he said.

Lin Boqiang, director of the China Centre for Energy Economics Research at Xiamen University, said the switch to natural gas remained the “right choice” in the short-term to improve quality.

“Internationally, the global supply of natural gas is still abundant and is likely to remain so until 2020,” he said.

Natural gas constitutes around 7% of China’s total energy supply. The severe shortage this winter is because government policy stoked a rise in demand that could not be met in time, according to Lin, especially after a few years of sluggish demand in the gas market.

“Three state-owned oil giants (referring to major gas operators CNPC, Sinopec, CNOOC) and some industry thinktanks did not believe the growth rate for this year could reach 15% to 16%. They were also caught off guard by the sudden surge in demand. When they finally sensed the change around the middle of 2017, it was already too late,” Lin explained.

Fitch Ratings estimates that China’s natural gas squeeze will be temporary only. Shortages will ease as winter demand drops off, while an increase in imports and improvements in storage infrastructure should steadily address seasonal shortages in coming years.

Shale gas

Besides adjusting to short-term changes and pushing forward with energy market reforms so that pricing of gas better reflects demand, Lin also advised China to foster its emerging shale gas sector to secure supplies in the mid- to long-term.

He said experience from the United States (US) shows that concentrated investment in shale gas has helped to facilitate research and development, technological know-how and substantial costs reductions, helping to bolster US energy security and exports.

China has a substantial shale gas reserve of 21.8 trillion cubic metres, of which 122 billion cubic metres is technologically recoverable, according to the Ministry of Land and Resources. However, environmental researchers have warned reserves are mostly in dry regions where water-intensive fracking could further exacerbate water scarcity.

Unlike in the US where the shale gas industry is strongly opposed by environmental groups following methane leaks and groundwater pollution, the main challenge to China’s fracking industry so far is geology. The country’s shale gas reserves are more dispersed and buried deeper than in the US, posing greater technological challenges. Nonetheless, the country’s top two operators, state-owned CNPC and Sinopec, are displaying “growing operation confidence”, according to energy research consultancy Wood Mackenzie.

China has become the world’s third-largest shale gas producer and its production in 2016 registered a 76.3% increase from a year earlier, to 7.9 billion cubic metres, said the Ministry of Land and Resources in July. It will have to increase production rapidly though to meet an annual production target of 30 billion cubic metres by 2020. ☞

Li Jing is a freelance writer covering environmental and climate issues.

河北清洁供暖的解决之道

河北一些农村地区因“煤改气”而出现供暖问题，显示出改善政策，实现清洁、低碳供暖的紧迫性。

□ 柳·力 侯·安德

这个冬天，中国互联网上充斥着关于河北省供暖短缺的争议。政府的目標是，在今年冬天完成该省很大一部分地区住宅供暖的“煤改气”或“煤改电”。但随着冬季的到来，有报道称一些地区不是没有足够的天然气供应，就是基础设施不够完善，不足以完成这一转型。一些村庄甚至完全没有供暖。

由于多数房屋的保温性能很差，有暖气的家庭纷纷抱怨改用天然气后，供暖成本过高。12月4日，政府发布紧急通知，放宽了天然气供暖设施不完善地区的煤炭供暖禁令。

河北省出现供暖问题的原因在于其对煤炭禁令准备不足，但也说

明了政府解决冬季空气污染问题的决心。

多年来，专家一直强调冬季燃煤供暖对京津冀地区空气质量的影响。造成该地区长时间被雾霾所笼罩的原因不单是因为冬季供暖与恶劣的天气模式相叠加，家用炉灶也是直接的污染排放源，而且这些排放对低收入人群的影响更甚。多项研究显示，在淮河以北那些燃煤供暖享受政府补贴或者免费的地区，民众的预期寿命低于淮河以南地区。

淘汰煤炭供暖不是简单地以损害农村居民的利益为代价，从而净化空气以造福城市住户。煤炉和采暖炉会产生黑碳和细颗粒物等危险

的室内污染物排放。美国健康影响研究所的一项研究发现，中国的疾病患病率和死亡率高与使用家用固体燃料有关，而受固体燃料燃烧造成的室内空气污染影响的主要是低收入农村居民。

今年冬天，京津冀及周边地区空气质量明显提高再次印证了减少小煤炉使用的必要性。11月，该地区PM2.5水平同比下降37%，卫星数据显示二氧化硫排放量比去年同期下降超过50%，居民燃煤减少是其中重要的驱动因素之一。

那么，是否有办法在彻底消灭小煤炉的同时，确保每个人都能拥有充足的供暖？

“ 中国的环境和能源计划的实施都是多年期的，但最重要的是在最后一年达成这个目标。2010年“十一五”规划末期，为了在这一关键时刻完成阶段性能源强度目标，一些地区不得不采取电厂停产，居民限电的措施。同样，河北供暖争议也发生在《河北省大气污染深入治理三年（2015-2017）行动方案》收官之年的最后一个月。 ”

问题何在

供暖短缺说明了政策实施只靠行政手段和地方政府存在的局限性。

能源政策本质上是复杂的，需要多个行业和各级政府的相互合作。地方领导在政策手段和对国有石油和天然气公司的影响力方面都很有有限。而这些公司负责铺设管道和线路，建造液化天然气接收站，勘探和开发天然气储备。

中央给出了3年的时间来逐步淘汰散煤。但一些地区的领导可能会忍不住把实施工作推迟到最后一年，一部分原因是为了延迟支出、节省燃料补贴，另一部分原因则是为了与省级或中央政府协商，为改造争取更高的补贴。

河北推行“禁煤区”的做法并不符合政府对外宣称的遵照“十八大”精神，更多地依靠市场机制解决环境问题的目标。“十八大”提出，应发挥市场在资源配置中的“决定性”作用，引入环境税等价格机制以纠正市场失灵。然而，此类政策的推行进展缓慢。例如，碳排放交易体系的推出一拖再拖，而且初期也将仅限于电力部门，不会影响个人购买煤炭的行为。

在中国，人们认为煤炭便宜，是因为煤炭有补贴、融资成本低，国

家对煤炭开采和运输有扶持，而且煤矿和电厂用水成本低，没有环境税，且水质和排放方面的执法不够协调一致。即便为碳排放定价或出台其他环境税，这种隐形补贴也不可能完全消失。

煤炭价格低廉，不仅阻碍了“煤改电”或“煤改气”的推进，也阻碍了对建筑质量和房屋保温措施的投入。全球各国的业主和住户普遍因为短期思维作祟，或者因为出租物业的业主无法直接受益，而忽视了对能源效率的投资。而在中国，劣质煤低廉的价格更是加剧了这一问题。

农村地区政府缺乏资金，无法对建筑进行大规模能效改造。缺乏能效投资意味着以其它能源替代煤炭供暖的成本会比预期高很多。

寻找解决方案

1. 出台透明化、分阶段的实施计划

一段时间以来，中国的环境和能源计划的实施都是多年期的，但最重要的是在最后一年达成这个目标。2010年“十一五”规划末期，为了在这一关键时刻完成阶段性能源强度目标，一些地区不得不采取电厂停产，居民限电的措施。同样，河北供暖争议也发生在《河北省大气污染深入治理三年（2015-2017）

行动方案》收官之年的最后一个月。

此次在最后一刻集中推动家庭供暖的“煤改气”转型恰逢其他行业的天然气需求高峰：在冬季取暖开始前的1月到10月，天然气需求已经飙升19%。工业锅炉、化工、发电等行业是天然气需求增长的主要原因。

加上家庭供暖，河北省的天然气需求陡增高达30%。“煤改气”基础设施的建设和运营需要协调各种复杂的政治经济力量，包括平衡各级政府 and 国有企业的责任分工。一个更加透明、详细的实施计划，以及公开的、逐年增长的强制性目标可以有助于避免这种断崖式的供气短缺。

一个更加透明的计划也将有助于私营部门在能源效率方面做出更加明智的投资决策。如果我知道自己今年冬天的取暖费会上升，就更有可能花钱改善建筑的保温措施。

2. 完善天然气定价和储气的市场规则

中国正努力朝着天然气市场定价机制转型。虽然现在市场的参与者更多了，允许第三方参与管网建设也有助于放宽市场准入，但天然气供应链的许多环节仍处于垄断状态，天然气价格也受到严格管制。

在更加灵活的价格机制下，天

然气价格在冬天的时候大幅上升，有助于刺激对地下储气库的投资，减少冬天用气高峰期进口天然气的需求。

提高对那些能够暂时停止用气（所谓的可中断需求）的工业用户的补助也能够使供气更加灵活，缓解短期供应紧张。厘清相关规则以化解新液化天然气进口设施（如天津一个拖延已久的进口码头）面临的监管僵局，也将有所裨益。

3. 基于绩效的公用事业激励机制

通过经济奖惩机制可以促使国家电网或中石油这样的国有垄断企业执行某些政策。许多国家公用事业单位的服务定价中都有一部分由绩效决定：政府监管者几乎可以通过绩效手段来鼓励任何自己想要鼓励的某一方面的表现。

归根到底，良好的绩效表现将得到更高的回报，而糟糕的表现，例如未能完成基础设施建设目标，将导致较低的回报。美国的电力公司利用此类激励措施提高可靠性和客户满意度，同时提高对新的房屋采暖或节能装置等客户能效升级技术的公用事业投资。基于绩效的费率制度，加上其他强制性目标，可有助于防止供暖短缺，解决建筑物能源效率投资不足等长期市场失灵问题。

4. 引入环境税以满足能效投资的需要

中国的地方各级政府可以筹集数量可观的资金用于建设新的公路、

机场、发电站和高速铁路，但在能源效率方面却长期缺乏资金投入，而这正是最具生产力的能源投资之一。明年开征的环境税将是解决这一问题一个机会。该税预计将为地方政府带来约 6000 亿人民币的收入，像河北这样的排放大省的税基也将是最大的。

省级政府在税率的制定过程中拥有很大的酌情决定权，但很多都可能把税率设置在较低水平，放弃潜在的大笔收入以降低工业排放者的生产成本。很明显，制定合适的税率能够带来收入，用于发展类似改善房屋保温性能这样的能效项目。

5. 不局限于天然气

2017 年，中国的天然气普及在政策驱动下一路高歌猛进，天然气替代了电力部门、工业锅炉和传统家庭使用的煤炭。中国之所以大力推进“煤改气”，原因在于地方政府和工业用户评估发现：天然气供暖的成本略低于电力采暖。结果是改用天然气供暖的家庭比计划公布时的政府预期多很多。

长远来看，包括地热、地源热泵、改善房屋保温措施、提高能源效率、电力部门对可再生能源的利用、以及天然气的恰当使用等在内的更加多元化的解决方案可能会在经济和能源安全方面产生更好的结果。另一大好处在于，上述方案的燃料成本远低于天然气供暖，因此无需持续的行政监督，就能确保用户不会为了省钱而回去烧煤。

新计划

上面这份建议清单看似令人生畏，但政府却直面挑战并制定了 2021 年的新目标。2017-18 年之交这个冬季开展的禁煤运动中，有 300 万户家庭完成“煤改气”供暖，约 100 万户完成“煤改电”供暖。政府的目标是到 2021 年有 1200 万户家庭完成“煤改气”供暖，大约 1500 万户家庭改用热泵或者直接电采暖。总体而言，政府的目标是在未来 4 年加速实现家庭供暖的清洁化转型，在 2017 年 400 万户的基础上，以每年平均超过 600 万户的速度增长。

新的供暖计划认识到需要加大农村地区的能源效率投资，并指出农村家庭供暖的平均能耗比城市家庭平均能耗高出 40%。将农村地区建筑能源需求减少 30% 的目标将有助于缓解天然气和电力需求增长的压力。

同样需要注意的是，新出台的这些雄心勃勃的禁煤目标不会导致天然气整体需求的急剧上涨。计划估计，2017-18 年度到 2021-22 年度供暖季增加的天然气需求总量为 180 亿立方米，仅为 2016 年需求量的 9%。但实施起来却并非易事，吸取过去的经验教训有助于避免今年这样的能源短缺再度上演。

柳·力，绿色和平气候变化与能源项目主任

侯·安德，独立政策研究咨询顾问，致力于清洁能源政策和交通电气化领域的研究

How to fix China's botched heating policy

Switching households from coal to gas need not leave people in the cold

□ Lauri Myllyvirta Anders Hove

The Chinese internet is buzzing with complaints about heating shortages in Hebei. The government had set this winter as the target to finally clean up residential coal heating in a wide swathe of the province by switching from coal to either natural gas or electricity.

But with the arrival of winter, there are reports that some areas have either insufficient gas supplies or inadequate

infrastructure to complete the switch, and some villages are without heating altogether.

For those with heating, there have been complaints about the high cost of switching to natural gas, given that many houses are poorly insulated. On December 4, the government issued a notice that partly rolled back its ban on coal heating for locations with insufficient gas infrastructure.

Hebei's heating problems have resulted from the inadequate preparation for the coal ban. But it shows just how serious the government is about addressing winter air pollution.

For years, experts have emphasised the contribution of coal-based winter heating on air pollution in the Beijing-Tianjin-Hebei region. Not only does winter heating coincide with poor weather patterns that lead to persistent periods of thick haze over the entire region, but household stoves create direct emissions that disproportionately affect the poor. Several studies have shown that areas north of the Huai river, where coal heating is subsidised or provided free by the government, suffer lower life expectancy than similar areas south of the Huai river line.



By 2021, the government aim to switch 12 million households from coal to gas heating in an effort to improve air quality and reform the country's energy grid

Switching out coal heating isn't just a matter of cracking down on villagers to clear the air for urban dwellers. Indoor air emissions from coal stoves and furnaces create dangerous black carbon and particulate matter emissions. According to a study by the Health Effects Institute, household use of solid fuel is associated with a huge toll of disease and mortality in China, and the effect of indoor air pollution from burning solid fuels falls mostly on poorer, rural residents.

The dramatic gains in air quality across the Beijing-Tianjin-Hebei region and surrounding areas this winter reinforce the case for reducing small-scale coal-burning. In November, the PM2.5 levels across the region fell by 37% and satellite data shows a fall of more than 50% in sulphur dioxide emissions from the same period last year, with reductions in residential coal-burning one of the important drivers.

So is there a way to eliminate small-scale coal-burning permanently while ensuring adequate heating for everyone?

What went wrong

The heating shortage demonstrates the limits to relying on administrative measures and local leaders for implementation.

Energy policy is inherently complex, requiring interaction of many industries and levels of government. Local leaders are limited in what policies they can pursue and the extent to which they can influence China's state-owned oil and gas companies, which are responsible for building pipelines and distribution lines, constructing huge terminals to receive liquefied natural gas, and exploring for and exploiting gas reserves.

Given a deadline of phasing out coal within three years, local leaders in some areas may have been tempted to delay implementation until the final year, partly to postpone expenditures and save on fuel subsidies, and partly to negotiate for higher subsidies from provincial or central authorities to make the changes.

The implementation of the Hebei no coal zone contrasts with the government's stated goal to shift towards market mechanisms for addressing environmental problems, in

keeping with the statement from the 18th party congress that market forces should play a "decisive role" in allocating resources, and environmental taxes and other pricing mechanisms should be introduced to correct market failures. However, the rollout of such policies has been slow. Carbon trading, for example, was delayed several times and will be initially limited to the power sector, not affecting coal purchased by individuals.

Coal is perceived as cheap in China because of subsidies, low cost financing, and state support for mines, for coal transport, for low-cost water use by coal mines and power plants, and for the lack of environmental taxes and inconsistent enforcement of regulations on emissions and water quality. Even with a price on carbon or other environmental taxes, it is unlikely that such implicit subsidies would disappear completely.

The low price on coal not only discourages switching to electricity or gas, but also discourages investment in quality buildings and insulation. While building owners or residents in all countries tend to discount investment in energy efficiency because of short-term thinking or the lack of direct benefit to the owners of rented buildings, in China the cheap price of low-quality coal has exacerbated the problem.

The government in rural areas lacks funding for widespread energy efficiency building retrofits. Lack of investment in energy efficiency means that alternatives to coal heating are more expensive than they ought to be.

Looking for solutions

1. Transparent, phased implementation plans

For some time, China's environmental and energy plans have been based on implementation periods of multiple years, but what counts is meeting the target in the final year. In 2010, at the end of the 11th Five-Year Plan period, power plants shut down and areas lost power in the crunch to achieve the period's energy-intensity target. Similarly, the Hebei heating crunch happened in the last month of the final year of a three-year air quality implementation plan.

The last-minute sprint to switch households to gas coincided with a peak in demand from other sectors:

natural gas demand had already surged 19% in the January-October period, and before the start of this winter's heating season. Industrial boilers, the chemical industry, and power generation were responsible for driving demand.

Adding in households, gas demand in Hebei may surge as much as 30%. To build and operate the infrastructure for this transition requires a complex interplay of political-economic forces, including balancing between different levels of government and state-owned enterprises sharing responsibility for implementation. A more transparent and detailed implementation plan, combined with mandatory, public targets that increase year-by-year, could have helped avoid the sudden cliff.

A more transparent plan would also help the private sector make wiser investments in energy efficiency. If I know my heating bill is going up this winter, I'll be more likely to invest in insulation, or consider renting in a more efficient building.

2. Better market rules on gas pricing, including storage

China is midway in its efforts to transition towards more market pricing of natural gas. While there are more market players today, and third-party access for pipeline networks will help ease market access, many parts of the gas supply chain are in monopoly hands, and gas prices are tightly regulated.

More flexible gas prices that can rise strongly when demand exceeds supply, such as in the winter, could help incentivise investment in underground gas storage, reducing the need for a sudden wintertime surge of gas imports.

More generous payments to industrial customers who can interrupt gas consumption (called interruptible

demand) could also unlock flexibility and ease short-term supply crunches. Clarifying rules to unlock regulatory standoffs surrounding new liquefied natural gas import facilities, such as a long-delayed import terminal in Tianjin, would also help.

3. Performance-based incentives for utilities

Implementation by government monopolies such as State Grid or CNPC may require monetary incentives (and penalties) for performance. Utilities in many countries are paid regulated rates determined partly by performance: virtually any characteristic regulators want to promote can be incentivised by performance-based rates.

Essentially, good performance is rewarded by higher returns, while poor performance, such as missing targets for building out infrastructure, leads to lower regulated returns. Utilities in the United States use such incentives to promote reliability, customer satisfaction, and utility investments in customer energy efficiency upgrades like new insulation or energy-saving appliances. Performance-based rates, paired with other mandatory targets, could help to forestall shortages and address long-term market failures such as underinvestment in the energy efficiency of buildings.

4. Environmental taxes to meet need for efficiency investments

While local governments in China can mobilise impressive amounts of investments for new highways, airports, power plants, and high-speed rail, they are chronically short of cash to spend on efficiency, which is one of the most productive energy investments available. One opportunity to fix this is the introduction of an environmental tax next year, which is expected to generate approximately 600 billion yuan in revenue for local governments, with the largest emitting provinces, such as Hebei, having the largest tax base.

Provincial governments have a lot of discretion in setting the tax rates but many may set taxes at the low end of the range, foregoing potentially significant revenue to shield their industrial emitters from costs. Setting meaningful tax rates would be an obvious way to generate revenue

“
The last-minute sprint to switch households to gas coincided with a peak in demand from other sectors.
”

for efficiency programmes, such as improving building insulation.

5. Looking beyond gas

In 2017, China saw a largely policy-driven dash for gas, as gas was used to replace coal in the power sector, industrial boilers and households. This was a result of a partial optimisation where local governments and industrial users assessed that gas-based heating is marginally cheaper than electric heating. As a result, more households were switched to gas than the government anticipated when the plans were announced.

A broader mix of solutions, including geothermal, ground-source heat pumps, better insulation and energy efficiency, as well as renewable energy in the power sector, combined with gas where appropriate, would likely yield a better long-term outcome in terms of both economics and energy security. The added benefit is that the listed solutions have much lower fuel costs than gas-based heating once installed, and hence require less constant enforcement to ensure households don't switch back to coal to save money.

The new plan

While this list of suggestions may seem daunting, the government is stepping up to the challenge with its new targets for 2021. As a part of the 2017-18 winter campaign,

three million households shifted from coal to gas heating, and around one million to electric heating. For 2021, the government will target 12 million households shifted to gas and approximately 15 million households shifted to heat pumps and direct electric heating. Overall, the aim is to speed up the rate of coal-to-cleaner heating switch from four million households in 2017 to an average of over six million households per year over the next four years.

The new heating plan recognises that major energy efficiency investments are needed in the countryside, noting that the average rural house consumes 40% more energy for heating than the average urban household. A targeted 30% reduction in building energy demand across the region will temper increases in gas and electricity demand.

It's also important to note that these new, ambitious targets for switching away from coal won't drive dramatic increases in overall gas demand. The plan estimates additional demand from the 2017-18 to the 2021-22 heating season at 18 billion cubic metres, or 9% of 2016 demand, with the increase spread over four years. Nevertheless, implementation will not be easy, and the lessons learned from the past campaign can help avoid a repeat of this year's energy shortages. ☺

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国际能源署： 中印能源革命将深远影响全球

中国的能源政策选择对于全球能源大局的定调至关重要。

□ 夏·洛婷

国际能源署的新报告指出，由于中国和印度的大规模投资，可再生能源的成本正迅速降低。

与此同时，美国作为头号油气生产大国的地位则更加巩固，代替俄国成为这些污染产业的领头者，奥巴马时期来之不易的绿色政策被摧毁殆尽。

《世界能源展望 2017》显示，中国正坚定不移地逐步摆脱煤炭，通过制定长期经济政策来支持可持续增长、消除空气污染并提出建设“美丽中国”的政治愿景。

国际能源署在这份年度报告中首次增加了一个关于中国发展新时期的章节。在十月份举行的中国共



由于中国和印度的大规模投资，可再生能源的成本正迅速降低

产党第十九次全国代表大会上，习近平主席再次重申要“打赢蓝天保卫战”。其中就包括要在“生态文明”精神指导下重新构建全国能源体系，所谓“生态文明”就是要与自然共同和谐发展。

引领未来的能源市场也符合习近平主席今年年初在瑞士达沃斯论坛上表述的观点，即建立一个以亚洲为中心的世界贸易新秩序。

《世界能源展望 2017》指出：“中国的选择对于全球趋势的定调至关重要，可以更快地推动清洁能源转型。中国清洁能源部署、技术出口和对外投资的规模注定会使其成为推动低碳转型的一个关键决定因素。”

报告还指出，美国已经毫无争议地成为全球头号油气生产国，并且预计产量将会继续扩大。

国际能源署负责人法蒂赫·比罗尔在波恩的一次新闻发布会上说：“未来十年，全球八成的新增石油产量将来自美国，超过之前一直是世界最大生产国的俄国。”他警告说，现有的和规划中的政策并不足以避免气候变化的严重影响。

聚光灯下的中国

国际能源署的这份最新报告在波恩联合国气候大会期间发布。而在其发布的前两天，“全球碳计划”的另一份报告称，在经过三年的零增长之后，2017年中国的碳排放预计将增加 3.5%。

但是，国际能源署的报告却认为，作为中国碳排放主要来源的煤炭使用正趋于下降。

比罗尔说：“中国的煤炭消费量正在减少，而非仅仅增长放缓。政府大力关闭低能效燃煤电厂和落后煤矿。我认为这一举措更多是出于空气污染而非气候原因。”

据预测，到 2040 年中国新增的发电产能将相当于美国的整个电力系统。国际能源署认为，根据现有政策，中国的煤炭消费将在未来几年达到峰值，到 2040 年将减少 15%。中国对电动汽车的投资也将占全球的四成以上。

煤炭正在被可再生能源、天然气和核能替代。三分之一的世界新增风电和太阳能光伏电站及近三分之二的在建核电站都在中国。同时中国也在大力投资天然气。

太阳能转型

2016 年，由于成本下降，中国约有一半的新建电厂都是太阳能电厂，超过了其他形式能源的增长。

比罗尔接受中外对话采访时说：“过去三年太阳能光伏的价格降低了一半，据我所知没有其他商品的价格在这段时间内下降这么多，面包、牛奶、汽油都没有。我们认为未来三年这个价格会再降一半。”

他说：“之前有人断言发展中国家只能依靠价格更低廉的煤炭，如今太阳能价格的下降让这个说法难以成立。”

印度政策开花结果

比罗尔说：“在印度和其他南亚国家，我们也看到了十分积极的进展。印度莫迪政府推行的快速普及电力的政策逐步得到落实。未来八年，印度将为 3 亿人口带来电力，这将是一个巨大的成就。”

但他也指出，印度、东南亚和撒哈拉以南非洲的能源普及工作仍任重道远。

比罗尔说：“未来 20 年，印度新增的发电产能将相当于目前欧洲的总产能。在撒哈拉以南非洲，国际能源署也看到能源普及率呈持续上升的势头。因此，各国政府都必须最大程度地抓住可再生能源成本下降的机遇大力发展，这一点非常重要。”

他补充说：“接下来，印度的主要挑战是太阳能供应如何满足人们晚上下班回家后的电力需求高峰。电池储能方面的创新将是解决这一问题的关键。”

非洲：可再生能源潜力最大

能源普及需求最为急迫的大陆就是非洲，这里有三分之二的人还没有获得电力。

比罗尔强调了非洲水力发电的巨大潜力，但同时警告说在河流上修筑大坝会破坏生物多样性和下游的人类居住点。^⑤

夏·洛婷，伦敦记者，主要关注中国及环境问题

China-India lead energy transition

'China's choices will play a huge role in determining global trends'

□ Charlotte Middlehurst

The cost of renewable energy is tumbling thanks to strong investment from China and India, according to new findings from the International Energy Agency (IEA).

At the same time, the United States has consolidated its place as the top oil and gas producer, and is replacing Russia as leader of these polluting sectors as the country also rolls back hard-won green policies dating from the Obama era.

The 2017 World Energy Outlook shows that China is shifting decisively away from coal, guided by long-term economic policies to support sustainable growth, clean air and a political vision of a “beautiful China”.

For the first time the IEA added a section on China's new phase of development to its annual report. At the Chinese Communist Party Congress in October, President Xi Jinping restated a commitment to “return to blue skies”, which involves restructuring the national energy system in accordance with the vision of an “ecological civilisation” – a political slogan that refers to development in harmony with nature.

Leading future energy markets also aligns with Xi Jinping's vision of a new world trade order that has Asia at the centre, which he expressed at the Davos Forum in Switzerland earlier this year.

“China's choices will play a huge role in determining global trends, and could spark a faster clean energy transition. The scale of China's clean energy deployment, technology exports and outward investment makes it a key determinant of momentum behind the low-carbon transition,” said the report.

The report said that the United States is already the undisputed global leader in oil and gas production, with further growth expected.

“In the next ten years, 80% of global oil production growth will come from US, more than Russia which has been historically the world's largest producer,” said Dr Fatih Birol, IEA executive director, at a press conference in Bonn. He cautioned that current and planned policies will be insufficient to avoid the severe impacts of climate change.

China in focus

The IEA's latest report was published at the United Nations Climate Conference in Bonn, just two days after a separate report from the Global Carbon Project claimed that China's carbon emissions are forecast to rise by 3.5% in 2017, following three years of flat growth.

However, the IEA report claims that coal usage, which is the principal source of emissions in China, is trending downwards.

"China's coal consumption is declining, not just slowing. The government is shutting down inefficient coal plants and primitive coal mines. This, I believe, is done for air pollution reasons rather than climate reasons," said Dr Birol.

By 2040, it is forecast that China will add electricity generation capacity equivalent to the entire US power system. The IEA expects China's coal consumption to peak in the next few years and fall by 15% by 2040, based on current policies. China is also expected to account for more than 40% of global investment in electric vehicles.

Coal is being replaced by renewables, gas and nuclear. One-third of the world's new wind power and solar PV is installed in China, and almost two thirds of nuclear plants under construction. The country is also investing heavily in natural gas.

The solar transition

In 2016, around half of all new power plants were solar, dwarfing growth in other energy sources by some margin, and driven by falling costs.

"The price of solar PV has halved in the last three years. I don't know any other good; bread, milk, gasoline, that a price has halved in that time. And we expect solar to half again in the next three years," Dr Birol told *chinadialogue*.

"This rapid fall in solar prices challenges the assumption that developing countries must go for coal as a more affordable option," he said.

Indian policies bear fruit

"In India and other parts of South Asia we are seeing tremendously positive progress. India has taken to major policies that the [Narendra] Modi government is pushing, bringing electricity to people in a short space of time. In eight years India will bring electricity to 300 million people. This is a huge success," said Dr Birol.

However, he noted that India, South East Asia and sub-Saharan Africa still have much to do to increase energy access.

"Over the next 20 years India is expected to add power generation capacity equivalent to what Europe has today. While in sub-Saharan Africa, the IEA sees no declining trend on energy access. It is important that governments, therefore, make the most out of the declining cost of renewables," said Dr Birol.

He added: "Going forward, India's major challenge will be to match solar energy supply with times of peak demand in the evening when people return home from work. New innovation around battery storage will be key to solving this problem."

Africa – greatest renewable potential

The continent that most urgently need to improve energy access is Africa, where two out of three people are without electricity.

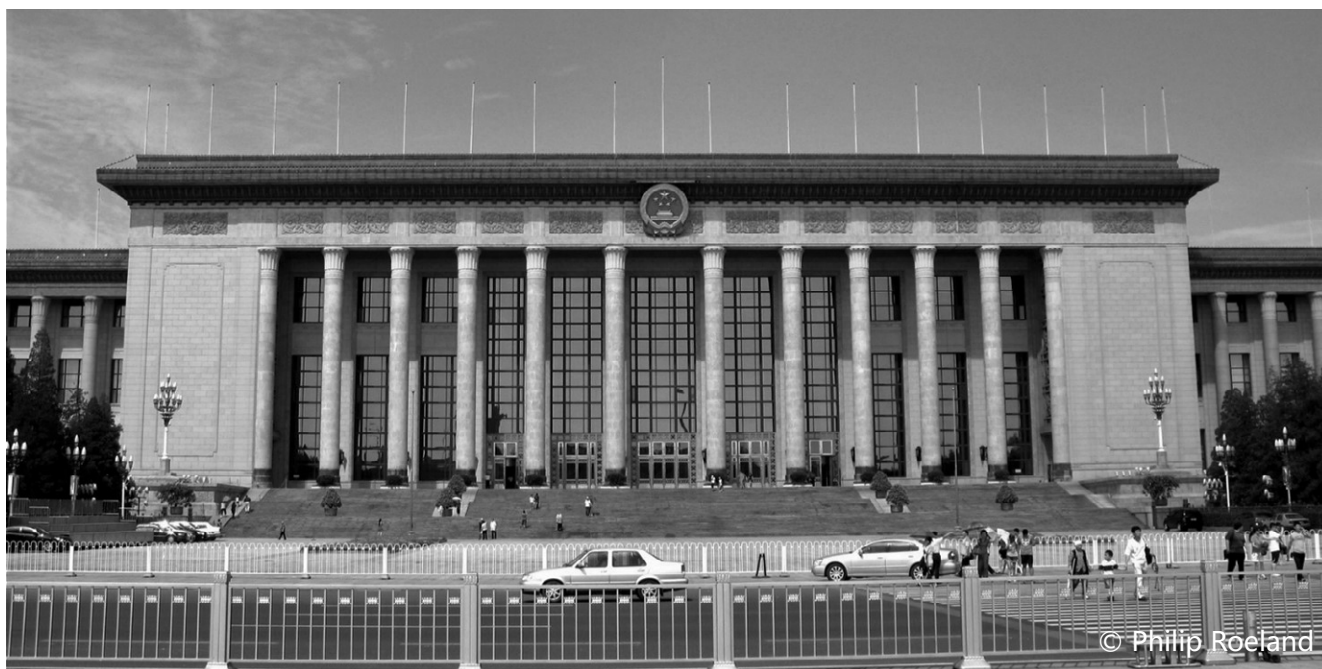
Dr Birol highlighted the huge potential for hydropower in Africa while at the same time warning that damming up rivers can damage biodiversity and human settlements downstream. ↻

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

中国将设立新的顶层环保机构

中共总书记习近平的十九大报告似乎证实，中国将会通过体制改革升级对自然资源的保护。

□ 刘琴



严格的环保措施写入中国共产党党章

邓小平被中国人称为中国实施改革开放和经济建设的总设计师。如今看来，习近平似乎有意成为中国生态文明建设的总设计师。

10月19日，在中国共产党第十九次全国代表大会（以下简称十九大）上，中共中央总书记习近平发表长达三个半小时的报告，并

在其中将建设生态文明称作是中华民族永续发展的千年大计。他感慨：“人类对大自然的伤害最终会伤及人类自身，这是无法抗拒的规律”。

这样感性的话语在中共最高规格的代表大会上并不多见，可见生态环境在习近平“建设美丽中国”蓝图中的特殊地位。不过相比这句带有哲理

的感慨，更为引人瞩目的是习近平还提出，为了“加强对生态文明建设的总体设计和组织领导”，将要设立新的，负责管理全国所有“自然资源资产”产权的机构，以及负责监管全国“自然生态”的机构。

这意味着，新的中央机构将对分散在全国各地的矿藏、水流、森林、

山岭、草原、荒地、海域、滩涂等各类自然资源统一行使所有权，负责全民所有自然资源的出让等。

生态文明建设为何需要新机构？

这并不是中共第一次产生设置顶层机构负责生态资产管理的想法。早在 2015 年 9 月发布的《生态文明体制改革总体方案》就提出设立新机构来监管自然资源资产。

这一举措之所以必要，是因为中国在资源、环境、生态方面有很多部门进行管理，有时缺乏对资源的统一考虑，从各自的领域出台很多具体的规定，反而出现混乱局面。

生态文明体制建设的亲历者和参与者、中央财经领导小组办公室副主任杨伟民此前告诉媒体，生态环境领域的改革，相对于其他方面的改革总体上滞后。其中一个原因，就是因为缺乏一个顶层设计。但环境污染的严重性等问题迫切需要对生态文明建设做出一个顶层设计。

利益冲突如何避免？

值得注意的是，中国的土地所有权分为全民所有和集体所有，而构建生态文明直接面临的问题之一就是，

国家想要严格保护的土地中有一部分事实上属于集体，而非全民，这意味着国家可能需要与集体进行土地(和资源)的所有权置换。

这一局面在正在进行的国家公园试点中已经体现出来。中央政府的计划是，通过租赁、置换等方式，将国家公园内的集体产权土地转变为国有产权，再由专门机构管理。

但有意见认为，这样做可能导致地方把最好的资源划给中央后，却没有任何直接的补偿和收益，必然会增加中央与地方的矛盾。尽管方案专门提出强化生态补偿机制，但谁会是这种补偿的受益者，目前并不明确。

设立专门的机构管理全国所有自然资源资产，就是为了保障产权重新划定顺利完成。目前，这一改革已经在各国家公园试点项目内进行。国家林业局局长张建龙表示，2018 年将完成试点区 80% 以上国有自然资源确权登记。

据新华社透露，2016 年 12 月底中共中央就下定决心整顿全国自然资源的管理。在中央全面深化改革领导小组的会议上，一份《关于健全国家自然资源资产管理体制试点方案》提出，自然资源的所有者和管理者要分开，并且一个部门只能管理一件事。

这两大原则意味着目前的自然资源管理部门(如林业局、海洋局)将不再同时行使资产所有权，而需要专门设立一个新机构行使所有权。而这个机构同样不负责其他职能，如生态环境保护监管，而要再新设一个独立的新机构专门负责。

不过目前“设立国有自然资源资产管理和自然生态监管机构”的表述并不具体，还存在很大想像空间。根据中科院可持续发展战略研究组 2015 年的一份关于生态管理体制改革的报告，究竟是成立专门的自然资源资产管理委员会和监管委员会，还是在自然资源管理部门下设相对独立的自然资源资产管理局和监管局，中共中央尚未形成共识。

但据业内人士分析，无论如何，十九大之后中国将开展涉及多部门的多项职责调整，几年以来广受关注的部委改革将逐渐浮出水面。

“出台生态文明体制改革总体方案，目的就是要整合统一。”杨伟民说。而整合统一，就需要对一些机构职责做出调整，“这会触及某些部门的奶酪”。☹

刘琴, 中外对话研究员

China gets new govt body

Xi Jinping announces new bureaus to protect natural resources at Party Congress

□ Liu Qin

Deng Xiaoping is remembered as the architect of China's market reform era and "opening up". Emerging from the 19th Communist Party of China (CPC) Congress, it looks as if Xi Jinping intends to be remembered as the architect of China's "ecological civilisation" – the Party's long term vision of a sustainable China.

On October 19, Xi gave a speech lasting three and a half hours to the Congress in which he said that building an ecological civilisation is necessary for the continued development of the Chinese people.

"The damage that humanity does to nature will ultimately harm humanity itself – this is an unavoidable rule," said President Xi.

Such strength of language is rarely seen at these high-level events and demonstrates the importance of ecological civilisation in Xi's plans to build a "beautiful China."

It accompanied a landmark announcement that China will set up a new body to take ownership of China's "natural resource assets" and oversee governmental bodies with responsibility for managing the country's "natural environment."

This has been interpreted as a move by central government to take powers from local officials over land usage, including control of mineral resources, waterways, forests, mountains, grasslands, deserts, oceans, and wetlands.

New body needed?

This is not the first time the idea of a top-level body to manage natural resources has been put forward at the central Party level; the overall plan for ecological civilisation reforms, published in September 2015, also proposed one.

A new overarching body would help address the internal, cross-ministerial conflict that has undermined China's environmental governance, arising from a complex structure of bureaus that sometimes compete and clash over resource management. This can result in individual bodies issuing regulations that meet their own needs, but that cause wider confusion, or lack broader consideration of other bodies' concerns.

Yang Weimin, head of the Office of the Central Leading Group for Financial and Economic Affairs, involved in

in the formulation of China's environmental strategy told Chinese news site People.cn in an interview in September that environmental sector reforms had lagged behind other reforms. One reason for this is the lack of an overarching plan – but China's severe environmental issues mean that one is urgently needed.

Conflicts of interest

One thorny issue to arise from the announcement is land rights. Currently, local governments “execute the ownership” of state land (rather than owning it outright), and have been profiting from taking de facto ownership of collective rural land, turning it into state land, and leasing it to developers.

With Beijing centralising the control of land currently managed by local governments, including that within national park boundaries, local governments will be unable to continue profiting from leasing this land.

This is already happening in the 10 trials of China's new national park system. The central government is taking control of all park land, which together accounts for 2% of China's total land area.

However, there is local concern that assets will be transferred to central government with no direct compensation or benefit, which will fuel tensions between central government and local officials. Although the proposal covers improving environmental compensation systems, it is not yet clear who will benefit.

Part of the new environmental body's function is to ensure these upcoming changes of ownership go smoothly.

Ownership and management

A *Xinhua* article at the end of December 2016 noted that the Central Committee decided to reorganise management of natural assets nationwide. At a meeting of the Central Leading Group for Comprehensively Deepening Reforms a proposal for trials to improve the management of natural assets was put forward. This would see a clear distinction between ownership and management.

This means that existing bodies responsible for the management of natural assets, such as the forestry or marine bureaus, will see duties transferred to the new body.

Responsibility for the protection of these assets will be handed to a separate independent department.

The reforms also include the national registration of natural assets. Zhang Jianlong, head of the State Forestry Administration, indicated that in 2018 ownership of 80% of assets will be registered.

However, as yet there is little clarity on what these new asset management and oversight bodies will look like. According to a 2015 report on reform of environmental management systems from the Sustainable Development Strategy Research Group at the Chinese Academy of Science, there was no consensus within the Central Committee on how much authority the bodies will have.

What is sure in the wake of the Congress is that responsibilities will change, although these changes may not be to the liking of all. ↻

Liu Qin is a researcher at chinadialogue.

十九大报告中习近平的环境话语

严格的环保措施写入党章，但生态体制改革仍然挑战重重，全面落实任重道远。

□ 龙·迪

2017年10月18日，中国主席习近平在共产党第十九次全国代表大会上作了报告。报告内容详实，面面俱到，囊括多个国家重点领域，并专门为环境问题辟出一个章节。对于中国的政策观察者来说，这是一份“顶级报告”。未来五年，习近平仍是中国的最高领导人，因此这份报告也可视为习近平的执政思想报告。

简言之，习近平的执政思路对环保事业是一大利好。放眼世界，环境问题迫在眉睫。尤其是在美国当前不利于环境与气候的政治局势之下，作为世界上最大的发展中国家，中国能拿出清晰明了的环境政策，

实在令人振奋。如果这些政策能够落到实处，未来十年，我们将看到长足的进步，全球环保事业将被注入一针强心剂。

环境：越发突出的重点

这份“习近平思想报告”囊括十四大原则，“坚持人与自然和谐共生”就是其中之一。这些原则是对共产党工作重点提纲挈领式的表达。

报告中的环境章节叫做“加快生态文明体制改革，建设美丽中国”，从题目就可窥见一斑。纵观报告，除了环境章节，没有哪个章节包含了“加快改革”的字眼，这说明

环保已经成为重中之重。“生态文明”描绘了一幅光明图景，要求将环保彻底融入经济、政治、文化和社会等方方面面。“美丽中国”把创建良好环境上升到国家自豪感的高度。然而政府的重视也反映出中国目前最大的问题，即现在的文明是不重视生态保护的，经济蓬勃发展的沿海地区也没有多少“美丽”的景象。

这里用了动词“建设”，在中文的语境下，这暗示着改革项目的规模之大、耗时之久。可是一想到“建设”这个词，我脑海里首先出现的是大型工程项目以及它们所带来的旨在促进消费的人造景观，而不是不受侵扰的自然环境。在中国十年

“报告中的环境章节叫做“加快生态文明体制改革，建设美丽中国”，从题目就可窥见一斑。纵观报告，除了环境章节，没有哪个章节包含了“加快改革”的字眼，这说明环保已经成为重中之重。”

的工作经历让我亲眼目睹了许多令人心痛的例子，如为了建造所谓的“生态城”，自然景观被夷为平地。不过在下一段，习主席就为这些错误做法敲响了警钟。

宏伟目标和工作重点

段落开头便准确揭示了我们面临的风险挑战，接着阐述了奋斗目标和指导原则。

“人与自然是生命共同体，人类必须尊重自然、顺应自然、保护自然。人类只有遵循自然规律才能有效防止在开发利用自然上走弯路，人类对大自然的伤害最终会伤及人类自身，这是无法抗拒的规律。”

“我们要建设的现代化是人与自然和谐共生的现代化，既要创造更多物质财富和精神财富以满足人民日益增长的美好生活需要，也要提供更多优质生态产品以满足人民日益增长的优美生态环境需要。必须坚持节约优先、保护优先、自然恢复为主的方针，形成节约资源和保护环境的空间格局、产业结构、生产方式、生活方式，还自然以宁静、和谐、美丽。”

这些原则让人备受鼓舞。当然，知易行难。接着，报告列出了四大工作重点：

推进绿色发展。这部分和经济

息息相关，包含了消费、清洁技术、循环利用、节能、节水、节约资源等方面的内容，也提出开展创建节约型机关等理念。

着力解决突出环境问题。除了空气污染、水污染和土壤污染治理等内容，这部分还涉及了一些新领域，如强化流域环境和近岸海域治理，强化农业面源污染防治等。同时还强调了环境信息披露、公众参与、社会组织的作用以及严惩重罚的制度。

加大生态系统保护力度。生态系统保护工作包括完成永久基本农田、城镇开发边界控制线的划定，以及推进荒漠化、水土流失治理、强化湿地保护和恢复、完善天然林制度等。保护生态系统被列为工作重点之一，令人欣慰，因为这个问题在过去一直未能得到足够的重视。

重大体制改革

上述第四个工作重点尤其值得注意，它暗示了重大的体制改革：

“设立国有自然资源资产管理和自然生态监管机构，完善生态环境管理制度，统一行使全民所有自然资源资产所有者职责，统一行使所有国土空间用途管制和生态保护修复职责，统一行使监管城乡各类污染排放和行政执法职责”

目前中国的环境治理由多个部

委分管，时有责任划分不明及内部利益冲突等问题。前面提到的新模式在2015年11月中共中央、国务院印发的《生态文明体制改革总体方案》中已经有所提及，但因为涉及对现有部门大头阔斧的改革，新机构一直未能设立。

根据我的理解，中国将成立一个部级部门，对森林、山川、湖泊、自然保护区等全民所有自然资源资产，持有合法所有权，甚至可能持有所有的公共土地。重要的是，这个机构能将任一自然资源破坏方告上法庭。在美国，类似职能由内政部行使，但仅针对公共土地，而且多是西部州的山区。

环保部可能将获得重要的职能，不仅监管污染（目前环保部的主要职能），还要监管生态系统保护。相信随着2018年的到来，关于体制改革的诸多细节将更加明朗。

全球环境治理及依法施政

报告的其他章节也多次提到环保，包括社会需求的改变、依法施政和更加积极地参与全球性事务等内容。

报告中着重强调了加强依法施政的必要性。这点对于开展环保工作十分重要，因为中国的环境问题就是环境法实施不当、执法不力的

后果。报告明确强调了司法应该在其中扮演的重要角色。

环境章节虽然没有触及全球环境治理的问题，但在其对更为广义的目标，即“坚持人与自然和谐共生”进行阐释时，习近平明确提出共产党应该“……为人民创造良好生产生活环境，为全球生态安全作出贡献”。19大报告的“中国的世界角色”一章也在环保问题上着墨良多。

结论

报告再次确认，环保仍将是政府的工作重心，政府将在未来几年

加大环保力度。在过去的一年里，环保部和中央纪委开展了多次地方巡查，曝光了很多环境违法行为。有三分之二的受检产业超标排放，同期，人民检察院（国家检察机关）受理了成千上万例地方政府环境违法的案件。估计政府和产业所面临的环境压力还将进一步增大。

习近平明确表示，中国已经意识到在确保全球生态安全方面应扮演的角色，鉴于中国在其他国家的大手笔投资，及其在应对气候变化保护生物多样性和海洋等相关的国际协议方面的重要性，强调这点尤其重要。

一个基本信息就是更加严格的

环保措施已经写入党章。环境治理在过去几年里取得的进展也证明这不是一纸空文。宏伟的法制改革和愈加严格的执法将进一步推动环境治理。同时，我们也要认清现实，即虽然环保已经成为重中之重，但生态体制改革仍然挑战重重，全面落实依然任重道远。☞

龙·迪，欧洲环境法律组织欧洲环保协会中国项目的首席代表

Examining Xi's environment thinking

An international expert's take on what China's environmental strategy means for the planet

□ Dimitri de Boer

At the 19th Communist Party Congress in October, China's president Xi Jinping delivered a long and dense report. It covered a wide range of national priorities, including a full chapter on the environment. For policy observers in China, this is the "mother of all reports". Delivered by the president following the first five-year term in office, it is the report in which Xi presents his ideology.



President Xi Jinping delivered his vision for the environment in China at the 19th Party Congress last month

"Xi Jinping's Thought" is excellent news for the environment. Given the many pressing environmental problems in the world, and the current political situation in the United States, it is encouraging that the world's largest developing country has a clear environmental policy.

If these policies are implemented, we could see great improvements in the coming decade, and these efforts could give a much-needed boost to environmental ambition around the world.

Elevated emphasis on the environment

Xi's Thought includes 14 principles, one of which is "ensuring harmony between humankind and nature". These principles can be considered the big plan, or an overarching statement of what the Party should focus on.

The environment chapter of the report is called, "Speeding up reform of the system for developing an ecological civilization and building a beautiful China". Just from the title we can learn quite a few things. No other

chapter has “speeding up reform” in its title, suggesting that ecological reform is a top priority.

“Ecological civilization” is a positive vision, which will require thorough integration of environmental considerations into the economy, politics, culture and society. “Beautiful China” ties a good environment to a sense of national pride. The priorities reflect China’s biggest problems – our civilization isn’t very ecological, and swathes of coastal China aren’t much to look at.

The verb “building” is used, which in the Chinese context suggests that it’s a major and long-term reform project. To me this verb still evokes images of large engineering projects resulting in landscapes that are designed for human consumption, rather than undisturbed nature.

Working in China over the past decade I’ve seen some painful examples of this going wrong, such as natural landscapes that have been bulldozed to make way for a so-called “eco-city”. However, in the next paragraphs president Xi makes explicit warnings against such mistakes.

Ambitious vision

The opening paragraphs accurately capture the risks that we face, and continue with a vision and overarching guiding principles:

“Man and nature form a community of life; we, as human beings, must respect nature, follow its ways, and protect it. Only by observing the laws of nature can mankind avoid costly blunders in its exploitation. Any harm we inflict on nature will eventually return to haunt us. This is a reality we have to face.”

The modernisation that we pursue is one characterised by harmonious coexistence between man and nature. In addition to creating more material and cultural wealth to meet people’s ever-increasing needs for a better life, we need also to provide more quality ecological goods to meet people’s ever-growing demands for a beautiful environment.

We should, acting on the principles of prioritising resource conservation and environmental protection and letting nature restore itself, develop spatial layouts, industrial structures, and ways of work and life that help

conserve resources and protect the environment. With this, we can restore the serenity, harmony, and beauty of nature.”

Of course, it’s easier said than done. Following these principles, the report continues with four priority areas:

Promoting green development. This encompasses everything related to the economy, including such things as consumption, clean technologies, recycling, and saving of energy, water and resources. It also spurs government to do better when it comes to conservation.

Solving prominent environmental problems. In addition to air, water and soil pollution, some new areas of emphasis are included here, such as river basin management, offshore areas and agricultural run-off. It continues to emphasise the importance of disclosing environmental information, public participation and the role of non-governmental organisations.

Intensifying the protection of ecosystems. Ecosystem protection includes strict boundaries for cropland and urban development, anti-desertification, anti-soil erosion, wetland conservation, natural forests, etc. It is good to see that ecosystem protection is now one of the major priorities, as in the past this has received insufficient attention.

Reforming the environmental regulation system.

Institutional reform

The fourth priority is particularly interesting, as it alludes to some major institutional reforms. It says:

“We will establish regulatory agencies to manage state-owned natural resource assets and monitor natural ecosystems, and improve environmental management systems. These agencies will, in a unified way, perform the duties of the owner of public-owned natural resource assets, the duties of regulating the use of all territorial space and protecting and restoring ecosystems, and the duties of

“ Any harm we inflict on nature will eventually return to haunt us. ”

monitoring the discharge of all pollutants in urban and rural areas and conducting administrative law enforcement.”

Currently, these duties are split over different ministries, sometimes with unclear divisions of responsibilities or with built-in conflicts of interest. The new model described above was already mentioned in the “Deep Reform Plan for Ecological Civilization” issued by the Central Committee and the State Council in November 2015. However, these new institutions haven’t yet been formed, probably because it involves major changes to current departments.

My reading is that a ministry-level department will be formed which will hold legal ownership of all public natural resources such as forests, mountains, lakes, and nature reserves. It may even own all public lands. Importantly, it will be able to go to court if parties cause damage to these resources. In the United States, the Department of Interior performs a similar function, but only for publicly owned lands, mainly in the mountainous western states.

The Ministry of Environmental Protection may gain important functions in regulating not only pollution (its current primary function) but also ecosystem protection. We should expect to get more clarity on these institutional reforms over the course of 2018.

Global environment and law-based governance

Other parts of the report also have major implications for environmental protection. These include the emphasis on the changing needs of society, law-based governance, and on China taking a more prominent role in world affairs.

The need to further strengthen law-based governance features very heavily in the report, with a chapter specifically dedicated to this ambitious reform. This is very important for the environment, because many environmental problems in China are the result of poor implementation and enforcement of environmental laws. The report clearly envisions a strong role for the judiciary.

The environmental chapter doesn’t mention global environmental governance, but in his broader introduction to the objective of “Ensuring Harmony Between Humankind

and Nature”, Xi Jinping explicitly mentions that the Party should: “... create good working and living environments for our people and play our part in ensuring global ecological security.” There is a whole chapter about China’s role in the world, which also contains much language about the environment.

Conclusion

The report clearly reaffirms that the environment will continue to be major priority for China, and that this work will intensify in the coming years. In the past year, the Ministry of Environmental Protection and the powerful Central Disciplinary Commission have been carrying out provincial inspections, which have exposed many environmental violations.

More than two-thirds of the industries inspected were found to be exceeding their standards. In the same period, the People’s Procuratorates (state prosecutors) have brought thousands of cases against government departments for their violations of environmental laws. I expect that this pressure on government and industries will continue to build.

President Xi also makes it clear that China understands that it should play its part in ensuring global ecological security. This is very important, given the massive investments which China is making in other countries, and its weight in international agreements on climate change, biodiversity, oceans, etc.

The bottom line is that a rigorous approach to environmental protection is now enshrined in the Party Constitution.

Developments in environmental governance in the past years suggest that these are not just empty words. They are backed up by ambitious legal reforms and increasingly strong enforcement. At the same time, we should have realistic expectations – even though they are a top priority, these ecological reforms are challenging and will take time to be fully implemented. ☺

Dimitri de Boer is chief representative in China of ClientEarth, a European environmental law group.

中国碳市场启航： 你需要知道的五件事

如何看待千呼万唤始出来的全国碳市场？

□ 白莉莉 姚喆



中国将完善全国碳市场的相关立法工作，到2019年全国性碳交易终将进入试运行

2015年，中国最高国家领导人习近平在一次中美双边会谈上宣布了将在2017年启动全国性碳交易市场的计划。对于世界头号碳排放国而言，要在短短两年内建立起全球最大的碳市场，难

度可想而知：这意味着中国需要获得并管理7000多家企业的碳排放数据，并设立松紧合度的排放总量，如此才能避免经济增长不被拖累。2013年开始，七个省市陆续上马区域性碳市场试点，为全国碳交易

试水。与此同时，国家发改委也发布政令，对十个重点行业进行温室气体排放数据的监测和记录。

这一系列工作为今天发改委正式宣布《全国碳排放权交易市场建设方案（发电行业）》奠定了基础。这份文

件相当于一份指导全国碳市场逐步成形的路线图。根据能源基金会北京办公室的分析，2018年中国将完善全国碳市场的相关立法工作，并完成发电企业的配额分配，到2019年全国性碳交易终将进入试运行。

那么，在目前阶段该如何看待中国全国碳市场“软启动”的意义呢？中外对话总结了五大看点。

1. 中国碳市场将是世界上规模最大的碳交易市场

等到正式上线，中国全国碳交易市场规模将超过长期以来位列全球第一的欧盟市场，成为全球最大的碳市场。即便首批仅纳入了发电/供热行业，其覆盖的二氧化碳排放量也将占到全国三分之一左右（35亿吨），并且最终将涵盖八个行业。由于电力/供热行业二氧化碳排放量占全国近一半，中国全国碳市场规模会几乎相当于欧盟碳市场的两倍。

谈到首批纳入碳交易市场的行业选择，能源基金会中国项目主管刘爽认为：“电力行业排放数据的

透明度和可信性都是最高的，所以是最适合作为首批纳入中国全国碳排放交易市场的行业了。这也是为什么世界目前规模最大的两个碳排放交易市场——欧盟碳排放交易体系和美国加州碳交易市场——都在初期就纳入电力行业的原因。”

2. 碳定价可能是中国最有效的减排工具

在中国实施的各项温室气体减排政策中，碳定价具有极大的减排潜力。国家应对气候变化战略研究和国际合作中心（NSCS）、发改委能源研究所（ERI）、能源创新机构（Energy Innovation）进行的建模分析表明，到2030年，在实施碳定价的情况下，碳排放将比常规情境减少27.49%。

尽管碳排放交易系统将发挥重要作用，但并非万能。该研究也指出，中国要实现气候目标，必须同步实施其他补充政策。中国目前的减排政策组合印证了这一观点：碳市场将与一系列其他措施共同发挥作

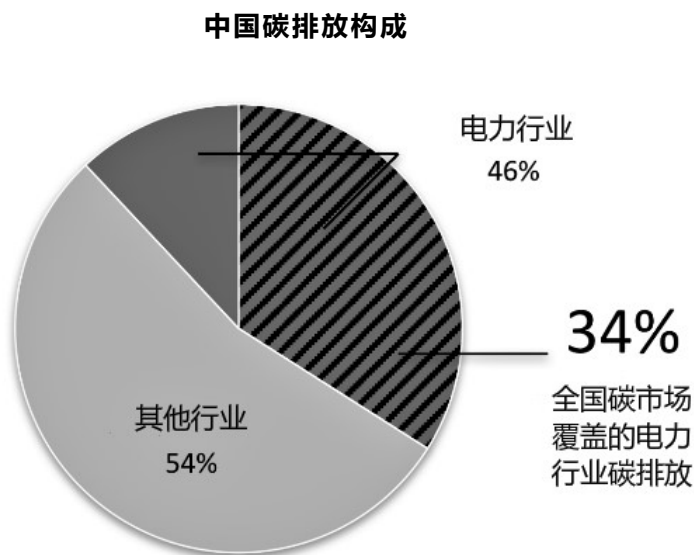
用，例如电力行业改革和新能源汽车双积分制度等。

3. 配额管理决定全国碳市场的减排效果

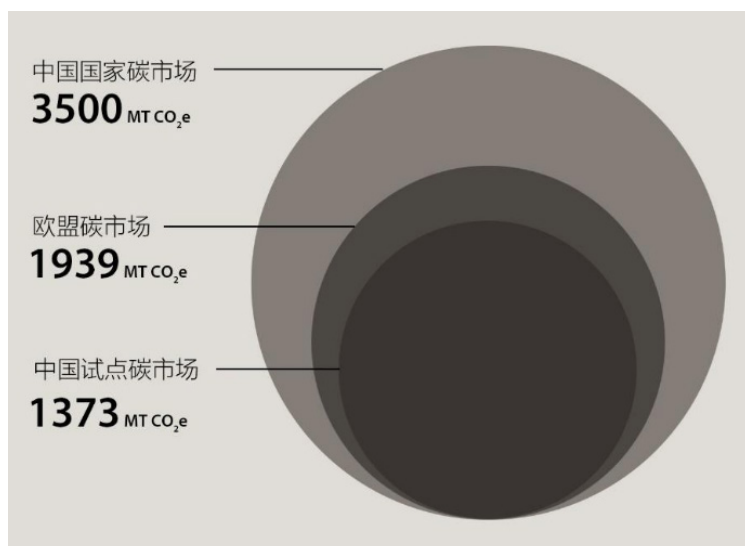
中国碳交易试点的市场碳价上下波动，但大多数时间维持在每吨60元人民币以下，平均价格大约为每吨30元人民币。国家发改委应对气候变化司副司长蒋兆理称，碳价要到2020年以后才会达到每吨200-300元人民币，在此之前，企业无法感到真正压力。2017年中国碳论坛问卷调查的结果显示，受访的业内人士普遍预计未来碳价会随着交易量增加而稳定上涨，但价格上涨幅度仍存在不确定性。

美国环境保护署估算，目前碳排放的社会成本为每吨41美元（272元人民币），而目前全球几乎所有碳排放交易系统的碳价都低于这一价格。碳价过低是所有碳交易市场的普遍现象，其主要原因是超额分配配额，中国的试点项目也存在这一现象。美国加州和英国近期就开始通过最低限价的方式来解决这一问题。中国也可以出台此类政策；中国碳论坛研究负责人休·斯莱特表示：“在试点项目中，中国主要依赖事后调整机制和价格稳定储备金的方式稳定碳价。但是，为了鼓励去碳，中国应该考虑实行最低限价制度。”

虽然由于低价和超额分配配额，碳交易市场的机制目前尚未催生出大幅的碳减排，但这些系统已经产生巨大的收入：到2016年年底，全球碳排放交易系统已创造收入近300亿美元。这一收入正用于其他气候变化减缓和适应项目中。



中国碳市场试点碳价-每日均价 (元/吨)
(2013年6月18日-2017年6月30日)



4. 区域试点为全国碳交易打下基础

自 2013-2014 年起,中国的试点碳市场开始进行交易,为建立全国碳市场打下基础。首批七个试点系统包括五市两省,涵盖 13.7 亿吨二氧化碳以及 3271 个责任企业。随着时间的推移,交易量不断增长。中国碳论坛 2017 年调查报告显示,2016 年试点市场的交易量和交易额分别增长了 106% 和 29%。试点系统合规性较高:2016 年以来,99% 纳入系统的企业能够遵守试点规定。

其中,北京碳市场的碳价最高,并保持高度稳定,维持在每吨 50 元

左右。包括广州在内的试点市场进行了配额拍卖试点——全国碳市场成立初期,配额实行免费分配,最终将逐步转变为拍卖方式。即使在全国碳市场开始交易之后,试点市场预计仍将继续运行一段时间,确保暂未纳入全国市场的企业参与数据收集和减排行动。

5. 碳排放交易系统将对投资决策产生实际影响

中国碳论坛进行的最新调查发现,受访者认为未来数年碳定价对投资决策的影响将不断增强。超过

四分之一的调查受访者来自工业领域,其中绝大部分身在碳市场所涵盖的行业。75% 的受访者认为,到 2025 年,其投资决策将受到中度或强烈影响。一名匿名受访者表示,“环境问题需要各方共同努力解决。市场化的社会发展方式不会快速改变,气候挑战迫在眉睫。此外,碳市场行业已足够成熟,今后三到五年必将产生强大的制约作用。”

展望未来

尽管全国碳市场仍然需要几年时间才能按原计划覆盖八大行业,并产生实实在在的减排效力,不少专家认为这一机制必将大力抬升中国的气候行动力度。刘爽说:“有了碳排放交易系统,中国就有了收集企业层面碳排放数据的常设的系统,这将为制定和完善其他碳政策奠定基础。排放限额和配额分配也使中央和地方各级政府获得了更多的经验和信心,从而可以制定出更加透明和公平的碳缓解行动方案。”

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姚喆,中外对话气候战略传播项目官员

China's ETS: 5 must-knows

China has unveiled a roadmap for its national carbon market

□ Lili Pike Yao Zhe

During a 2015 bilateral meeting with the United States, President Xi Jinping announced a plan to launch a nationwide emissions trading system (ETS) by 2017. This was something of a moonshot for the world's biggest emitter: the creation of the largest carbon market in the world.

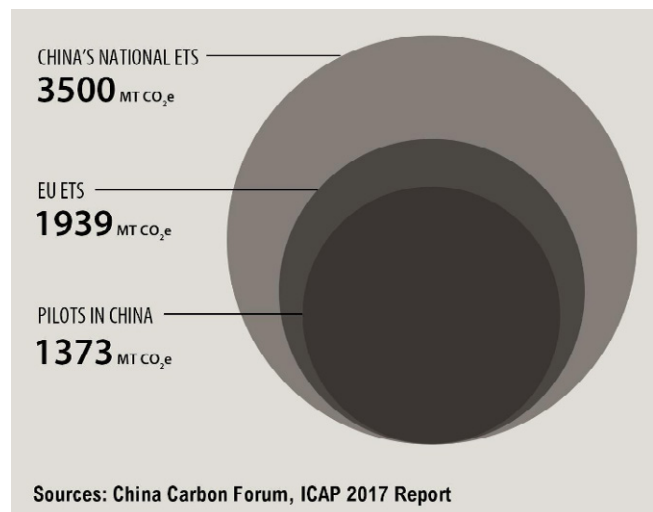
Pulling it off would require gathering data from 7,000 enterprises and setting a cap that would reduce emissions without overburdening industry. In 2013, provinces started laying the groundwork for this by creating their own pilot markets. Meanwhile, the National Development and Reform Commission (NDRC) enlisted ten sectors to start providing data on their historical greenhouse gas emissions.

Building on this foundation, the NDRC today outlined a roadmap for the development of a national-level carbon market over the coming years. In 2018, the legal basis for the ETS is expected to be strengthened and allowances will be allocated to power companies, according to analysis by Energy Foundation China. The market will then enter a trial period in 2019. While many details have yet to be revealed, here are five key facts about the emerging market.

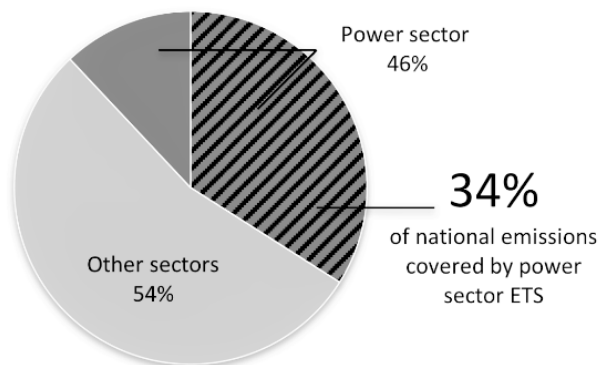
1. China's national ETS will be the world's largest carbon market

When China's ETS is fully operational, it will surpass the European Union's (EU) carbon market to become the largest carbon market in the world.

China's initial national market – composed of power generators – will cover approximately one-third of the country's carbon emissions (3,500 MT CO₂e). The market



Emissions covered in the national ETS



will grow to include eight sectors. Because the power sector is the country's largest, the initial single-sector market will still be almost twice the size of the EU market.

Liu Shuang, programme director at Energy Foundation China, said: "The power sector is the most suitable sector for China to start its national ETS from as this is the sector with the most credible and transparent emissions data. That is why both the EU ETS and the California carbon markets, the world's two largest running emissions trading systems, all included the power sector in their early phases."

2. Carbon pricing may be the best tool to slash China's emissions

Compared to other climate policies, carbon pricing is expected to play the largest role in reducing China's greenhouse gas (GHG) emissions in the future. By 2030, carbon pricing could reduce CO₂e by 27.5% compared to a business-as-usual reference scenario, according to modelling by the National Center for Climate Change Strategy and International Cooperation, the Energy Research Institute, and Energy Innovation. Their study ranks this contribution to emissions reduction as the strongest among all policies.

While the ETS is projected to play the leading role, it is not a silver bullet. The study shows that other complementary policies must be implemented simultaneously for China to achieve its climate goals. The Chinese policy landscape reflects this reality; the ETS is expected to work alongside a slew of other policies and targets such as power sector reforms and new energy vehicle sales quotas.

3. Emissions reduction will require careful market design

Prices in China's pilot markets have fluctuated but have mostly stayed below 60 yuan/tonne and average approximately 30 yuan/tonne. According to the deputy head of NDRC's climate change department, Jiang Zhaoli, companies will not feel real pressure to cut emissions until the carbon price hits 200-300 yuan/tonne, which he does not expect to happen until after 2020.

Results from China Carbon Forum's 2017 China Carbon Pricing Survey show respondents (who are involved in the market) expect prices to rise steadily in the future as national market trading picks up, although uncertainty remains as to the extent of the price hike.

The US Environmental Protection Agency (EPA) estimates that the social cost of carbon is currently US\$41/tonne (272 yuan) and almost all ETS carbon prices worldwide fall below this price. The low prices seen across all carbon markets are largely a result of the over-allocation of allowances, which has also occurred in China's pilots.

This global issue is starting to be addressed through price floors, which California and the UK have introduced. Such policies could also be implemented in China.

Huw Slater, research manager at China Carbon Forum said: "Carbon prices have had a marked impact on emissions in places where a level of price certainty has been provided...In the pilots, China has mostly relied on ex-post adjustment mechanisms and price stability reserves to manage extreme prices. However, in order to encourage decarbonisation, a price floor could be considered."

Although most carbon markets have yet to yield significant emissions reduction due to low prices and over-allocation, the systems are bringing in a large amount of revenue: carbon markets worldwide raised close to US\$30 billion (198 billion yuan) by the end of 2016. This revenue is, in turn, being reinvested in other climate change mitigation and adaptation programmes.

4. China's pilots have laid a solid foundation

China's pilot markets have been trading since 2013-14, paving the way for the national market. The first seven pilot

markets – spanning five cities and two provinces – already cover 3,271 liable enterprises and 1,373 MT CO₂, over half the scale of the single-sector national market.

Over time, trading activity in the pilots has increased; trading volume and value grew 106% and 29% respectively in 2016. A high compliance rate has been achieved: 99% of included enterprises abided by their pilot's rules as of 2016.

Leaders have emerged among the pilots, helping to establish best practices for the national market. Guangdong and Hubei have experimented with auctioning allowances, the allocation approach the national market intends to eventually transition to after an initial period of free allocation.

The Beijing market has maintained the highest and most stable carbon price, hovering around 50 yuan (US\$7.6)/tonne. After the national market begins trading, the pilots are expected to continue operating for some time, keeping enterprises outside of the national market scope engaged in data collection and carbon cutting.

5. The ETS is expected to have a real impact on investment decisions

According to the most recent survey conducted by China Carbon Forum, respondents expect carbon pricing to increasingly affect investment decisions in the coming years.

Over a quarter of respondents hail from industry, the vast majority of which are covered by the ETS. Of the

respondents, 75% think their investment decisions will be moderately or strongly affected by 2025.

One anonymous survey respondent said, “Environmental problems need a combined effort. The market-oriented way of social growth will not change soon, and climate change is imminent. In addition, the carbon market industry is mature enough, so it will inevitably generate a strong constraint in the next three to five years.”

Looking ahead

Although the ETS will take a number of years to ramp up to full sectoral coverage, and to start driving significant emissions reduction, experts see this process boosting China's overall climate action efforts.

Liu Shuang said, “Because of the ETS, China has a standing system collecting company-level carbon emission data, which will be the foundation for developing and improving many other carbon policies. Cap-setting and allowance allocation practices also equip policymakers, both on central and regional levels, with better knowledge and confidence in developing more transparent and fair carbon mitigation actions.”

Lili Pike is a strategic climate communications specialist for chinadialogue and the executive director of the Beijing Energy Network.

Yao Zhe is a strategic climate communications officer at chinadialogue.

水污染治理重创珍珠养殖户

全国整治水污染的举措或将导致中国淡水珍珠养殖业的大规模洗牌。

□ 劳伦特·E·卡地亚 杜雨洁

愈发严格的水质标准令中国的珍珠养殖户举步维艰，珍珠产业正在失去它的光泽。2015年，为治理河流及沿海地区水污染、保护地下水质量，中国中央政府发布《水污染防治行动计划》（简称“水十条”），而随后严格的执法活动让珍珠养殖业陷入了困境。

虽然一些养殖户改用了更高效的技术，但大量不符合标准的池塘遭到取缔，养殖户只能努力适应。

标准提高

《水污染防治行动计划》针对的是采矿、化工和制造业等所有污染

严重的行业，以及包括长江和黄河在内的重点流域，并且制定了水生态系统功能修复的国家标准和时限。

养殖珍珠的淡水湖（大部分是人造的）需定期加入废水以促进藻类生长，为珠蚌提供养分。

中国的淡水珍珠养殖业规模庞大，主要集中在浙江和湖北省中部，养殖塘面积达数百平方公里。上世纪80年代初，中国回归国际珍珠市场，改变了全球珠宝行业的格局。

虽然很难找到可靠的统计数据，但据估计中国的珍珠产量最多时达到每年1500至2000吨，目前大约为每年600吨。

大规模产出

天然淡水珍珠采集在中国有几千年的历史，而用淡水珠蚌生产珍珠则始于13世纪。

中国巨大珍珠产量背后的功臣就是淡水珠蚌。日本（阿古屋母贝）、大溪地（黑蝶贝）以及澳大利亚（大珠母贝）的海水珠蚌通常每代只生成一颗珍珠，淡水珠蚌的产量却非常大。

常见的由池蝶蚌和三角帆蚌杂交所得的珠蚌一次能够容纳50颗无核淡水养殖珍珠。

二十世纪80年以来，中国大量生产珍珠，为世界提供了不同价位



© 劳伦特·E·卡地亚

湖南省养殖淡水珠蚌的人工池塘

的养殖珍珠，从而为珍珠产业打开了新的市场和细分市场。

鱼类和粪便

大多数淡水珠蚌都养在深度为 2 到 3 米的湖泊或人工池塘里，最多养至 5 年即可以收获。

为了培养尽可能多的藻类作为珠蚌的食物，养殖塘里投放了大量发酵后的动物粪便，经常还会有化肥。

其结果是池塘中的水往往富含营养物质，导致水体表面藻类爆发且缺乏氧气，即所谓的富营养化。

为防止这一情况，养殖户在池塘里混养了以浮游植物为食的鲤鱼科鱼类（通常是白鲢和鳙鱼）。但如果管理不善，珍珠养殖还是会加剧

水和土壤中的养分消耗，造成水污染和富营养化。

10 年来，人们的担忧不断加剧：2007 年，湖北省暂停发放新的珍珠养殖许可证，并下令清理蓝藻水华。

努力适应标准

2015 年《水污染防治行动计划》的执行对珍珠产业造成严重影响，众多珍珠养殖户被迫改善养殖塘的水质。

该计划预计到 2020 年，七大重点流域（一些靠近珍珠养殖地区）水质优良（即进入供水系统后足够达到饮用水的水质标准）比例总体要达到 70% 以上，即达到或优于 III 类（详见表 1），地级及以上城市建成区黑臭水体均控制在 10% 以内。

2016 年末，湖北省出台珍珠养殖禁令，要求在 2017 年 4 月前消除所有 V 类及劣 V 类水体。

由于污染水域面积巨大，湖北省农业和渔业部门的官员制定了这项禁令以落实该地区 2015 年的水体修复计划。

湖北一家被关闭的珍珠养殖场告诉记者，他们曾拥有 1.8 万亩的珍珠养殖塘，相当于 72 平方公里。另一家公司说产量下降了 30%-40%。

在浙江诸暨，中国珍珠养殖的发源地，这只是最新一波的池塘取缔潮。过去 20 年，随着工业化的发展，珍珠养殖塘逐渐向更偏远的农村地区转移，诸暨作为珍珠贸易中心的重要性已经超过了其作为珍珠生产枢纽的地位。

表1

水质分类	适用范围
I类	源头水（如河流源头和受保护的自然集水区）
II类	集中式生活饮用水地表水源地一级保护区
III类	集中式生活饮用水地表水源地二级保护区及游泳区
IV类	工业用水区及人体非直接接触的娱乐用水区
V类	农业用水区
VI类	基本无用

浙江省珍珠行业协会称，2005至2016年间，淡水珍珠养殖场从38万亩减少至16万亩，产量从2000吨跌至1000吨，少了一半。

诸暨剩余的养殖户必须适应新的限制。2月21日，诸暨水利部门官员宣布将划定9000多亩珍珠禁养区，涉及170多家养殖场。

要想继续从事珍珠养殖业，养殖户就必须在2017年底之前使水质达到IV类标准（即适用于娱乐用

水）。而2017年年底之后，养殖塘的水质标准有可能会上调至III类，即可用作饮用水源。

新技术

官员们承认，这些地区的水体修复对养殖户而言既昂贵又复杂，但他们坚持认为，为了珍珠产业的长期繁荣发展，同时为了落实2015年水污染防治计划，这么做是必须的。

一些珍珠养殖户和科学家正在研究如何通过在水产养殖中更大程度地利用自动化来避免水体出现富营养化。一种选择是从“传统的污水养殖”转向“自动化水产养殖”，利用计算机控制系统，更加高效地过滤和管理水质和食物投放。

珍珠产业要想繁荣，这类创新是必须的。

最近一项关于优化珍珠养殖塘中鱼类和珠蚌放养比率的研究表明，这方面也需要更多的研究。

新规迫使珍珠产业不得不进行技术升级，用更具生态可持续性的方式生产珍珠。虽然，目前这对养殖户来说难度很大，但终将推动淡水珍珠养殖业朝着可持续性更强、品质更优、价格更高的方向发展。

劳伦特·E·卡地亚，就职于瑞士宝石研究所（SSEF），也是瑞士洛桑大学的一名讲师，他参与创立了可持续珍珠项目以及宝石&可持续发展知识中心。

杜雨洁，台北的宝石学家，曾在亚洲地区发表过诸多与宝石和珠宝相关的著作。

Pearl farmers hit hard pollution clean-up

China's freshwater cultured pearl industry facing mass closures to fix water waste

□ Laurent E Cartier Judy Tu



© Laurent E Cartier

Freshwater cultured pearl grading in a sorting factory in Hunan province

China's pearl industry is losing its lustre for farmers struggling to adapt to stricter clean water standards that are changing the industry.

In 2015, China's central government released a 10-point action plan to clean up the country's filthy rivers and coasts,

and protect groundwater quality. Tough enforcement has caught the pearl growing industry in its net.

Producers are struggling to adjust to widespread shut downs of substandard ponds, though some are shifting towards more efficient, innovative technology as a result.

Higher standards

The Water Pollution Prevention and Control Action Plan took aim at serious pollution from all industries, including mining, chemicals and manufacturing, by setting national standards and deadlines for water remediation, and targeted major river basins, including the Yangtze and Yellow Rivers.

Pearl cultivation uses freshwater lakes (mostly man-made), regularly topped up with sewage to encourage the algae that nourish pearl-producing mussels.

China's freshwater pearl industry operates on a vast scale in its heartlands in Zhejiang and Hubei provinces, where ponds cover hundreds of square kilometres. China's return to the international market in the early 1980s transformed the use of pearls within the global jewellery sector.

Although reliable statistics are hard to find, Chinese production is thought to have reached between 1,500 and 2,000 tonnes per year at its peak, with current production estimated at 600 tonnes per year.

Massive output

Natural freshwater pearl fishing dates back several millennia in China, and the production of half-pearls in freshwater mussels developed in the 13th century.

Freshwater mussels are behind China's huge output of pearls. Whereas saltwater pearl oysters from Japan (Akoya oyster), Tahiti (*pinctada margaritifera*) or Australia (*pinctada*



Freshwater cultured pearl farm near Changde, Hunan province. The mussels are placed in nets that are suspended from plastic bottles. Such water bodies are being investigated and regulated by authorities

maxima) are generally expected to form one cultured pearl per generation, freshwater mussels can produce vast quantities.

The widely-used *hyriopsis schlegelii* and *hyriopsis cumingii schlegelii* mussel hybrids are capable of housing up to 50 freshwater cultured pearls at a time.

The large quantities produced in China since the 1980s have opened up new markets and market segments to the pearl industry, by offering cultured pearls at varied prices.

Fish and faeces

Most freshwater mussels are cultivated in lakes or man-made ponds, two or three metres deep, where they grow for up to five years before harvesting.

The ponds are enriched with fermented animal manure and often chemical fertilisers, too, to produce as much algae as possible, the phytoplankton food for mussels.

The result is pond waters that are often heavily loaded with nutrients, leading to coatings of algal blooms and oxygen deficiency, a phenomenon known as eutrophication.

To prevent this, carp that consume phytoplankton (usually silver carp and bighead carp) are added to the ponds. However, when badly managed, pearl cultivation can exacerbate nutrient depletion of water and soils, causing water pollution and eutrophication.

Concern has grown in the past decade: in 2007, Hubei province temporarily banned new pearl farming licences while ordering a clean-up of blue-green algae blooms.

The struggle for standards

Implementation of the 2015 Water Pollution Prevention and Control Action Plan is having a serious impact on the pearl industry, forcing many pearl producers to improve the water quality of their ponds.

The plan foresees that by 2020 the quality of over 70% of the water in seven key river basins (some close to pearl farming areas), will be of sufficient quality to provide drinking water, i.e. level III or above (see table), and the amount of foul water in urban built-up areas will not exceed 10%.



Manure is dumped into lakes to foster algae growth, which feeds pearl mussels

In Hubei province, pearl farmers faced a fresh ban in late 2016 to eradicate all waters of quality standard V or lower by April 2017. Agriculture and fisheries officials devised this ban to implement the 2015 water remediation plan in their areas, given the large extent of polluted water.

One shuttered Hubei pearl farming company told reporters that it had about 73 square kilometres of pearl producing ponds. Another said production was down by 30%-40%.

In Zhuji, Zhejiang province, the birthplace of pearl production in China, this is simply the latest wave of closures. Zhuji has become more important as a pearl trading centre than a pearl production hub, as industrialisation has shifted ponds to more rural areas in the past two decades.

The Zhejiang pearl association has said freshwater pearl farming declined from about 25,000 square kilometres to less than 10,000 between 2005 and 2016, and output halved from 2,000 to 1,000 tonnes.

Zhuji's remaining pearl farmers must adapt to new restrictions. On February 21, Zhuji water conservancy

officials announced that 6000 square kilometres, encompassing more than 170 farms, would be banned for pearling.

To continue trading, their waters must meet water standard IV (suitable for recreational use), by the end of 2017. Water quality may then rise to standard III, which can be used as a source of drinking water source.

New technology

Officials accept that the remediation of these sites is costly and complicated for farmers but assert it is necessary for the industry to thrive in the long-term, and to satisfy the 2015 plan to control water pollution.

Some pearl farmers and scientists are investigating how greater use of automation in aquaculture could help to avoid eutrophication. One option is to move from "traditional sewage farming" to "automatic water culture" using computer-controlled systems to filter and manage water and food resources more efficiently.

A recent study on optimisation of fish to mussel stocking ratios in pearl ponds showed more research is needed there too.

The new regulations are forcing the industry to upgrade its techniques to produce pearls in a more ecologically sustainable manner. Although pearl farmers are having a difficult time at present, the changes may ultimately lead to sustainable, better quality freshwater cultured pearls that will fetch higher prices. ☺

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中国严格环境执法形势下的外企出路

对环境负责任的企业比污染企业更受青睐，这个“新常态”正在出现。

□ 孔·宏德 庄·博闻

中央政府环保督察巡视组与各级地方政府机构协调行动，对 30 个省区市展开了一场大规模环境执法检查。迄今为止，已经有超过 3 万家企业和 5700 名官员受到处罚。

而且，这并非一场一次性行动，中国中央政府已经决心要两年一次地持续下去。

习近平主席在十月举行的中共十九大上发表长篇讲话时说道：“人类对大自然的伤害最终会伤及人类自身，这是无法抗拒的规律。”这番表述意味着官员们要对环境问题严阵以待。

最近的立法赋予了巡视员们新的利器，也强化了巡视的影响。他们

的下一个巡视目标将对准京津冀的空气污染。

这些巡视代表着中国环境执法的一个新范式，在其背后是强大的法律、新的司法和行政架构以及来自最高层的政策支持。

聚力

2014 年，面对北京“末日般的”雾霾，李克强总理宣布向污染开战。当时，可能很少有人充分认识到这其中的重大意义。但是，在李总理讲话之后启动的一系列措施正在改变中国人对于环保问题的无助感和冷漠感。

中央政府接下来的“十三五”规划向着环境目标全力冲刺，随后又宣布了“大气十条”、“水十条”和最新的“土十条”等多项十年环境政策行动计划，以及人们期待已久的更严厉的法律法规。

不过，真正有望改变固有的“唯经济增长”模式的，还要算 2015 年初生效的新《环境保护法》。

强有力的法律措施

这部法律让执法部门有了制裁环境违规者（也包括企业高管和监管者）的有力武器。

其中最有力的措施是将违规罚

“在华外国商会和其他行业协会纷纷接到企业的求助电话，被要求为会员企业举办研讨会，分享经验和建议。一些企业也开始开展更多的内部环境审计，以更好地适应新形势。”

款标准从“按次”改为“按日”，这极大改变了“污染与守法”之间的成本对比。对于屡教不改的企业，可对高管责任人处以行政拘留 15 日的处罚。另外，按照相关规定，政府官员的晋升也与环保政绩挂钩。

为了更好地推进这些变革，一些非政府组织如今也可以发起公益诉讼。

非政府组织还在以其他方式推动着环境法规的落实。10 月，倍受业界尊重的公众环境研究中心在“2017 绿色供应链论坛”上发布了“企业环境信息公开指数”（CITI），并为约 260 个知名品牌企业打了分。

大多数跨国企业对于日益严厉的环境法规以及执法行动非常关心，因为这对他们的供应链管理提出了更大的挑战。一些企业与外界分享了他们的对策，另一些则承认在保证其供应链守法合规方面尚缺乏经验和资源。

新范式

这些新变化体现了一场根本性的转变。之前，环境部门的工作重点是事前批准，也就是把大部分注意力放在环境影响评价和建设审批上。如今，他们的工作重点变成了对企业合规和负责任经营进行监督。

法律虽然提供了执法工具，但如果如果没有强大的政策支持还是无法成为

推动社会变革的利器。最近推出的一连串政策表明，环境执法工作将坚定不移地继续下去，而且与反腐一样成为中国政府的优先要务。

其他利好因素也不断涌现，比如环境部门训练有素的工作人员越来越多，法院系统的环境诉讼专家也与日俱增。

态度大转变

关于这个新范式以及地方政府对于经济发展的态度变化，一个典型例子是包装巨头利乐公司。

26 年前，当利乐公司打算在华南建立工厂时，佛山市政府在距离城区几英里的一个新工业园区为其提供了一块地。该公司建厂后，曾一度占据中国 90% 的纸质饮料包装市场，并且在很多年里是佛山最大的纳税企业。

但随着佛山的发展，曾经位于郊区的利乐工厂被扩展的城区所包围，周边的居民担心空气污染问题。

由于当地民众的多年抗议，加上公司在 2016 年被课以 1 亿美元的反垄断罚款，利乐终于在今年夏天将生产转移到呼和浩特、昆山和北京的工厂。

焦虑的外企

这波执法浪潮对中外企业一视同仁。在华外国商会和其他行业协

会纷纷接到企业的求助电话，被要求为会员企业举办研讨会，分享经验和建议。

一些企业也开始开展更多的内部环境审计，以更好地适应新形势。

地方特权的终结

怀疑者可能会认为，一旦中央巡视组回到北京，地方合规问题会恢复原状。但最近新出台了另一项法律，旨在防止地方退回到“唯增长”模式。

即将于 2018 年 1 月 1 日起施行的《环境保护税法》将排污费变成一个税种，排污监测和征税工作已经从地方政府手中转移到由税务和环保部门建立的联合平台。

如果再继续对他们喜欢的地方企业的排污费进行免除或补贴，以此架空环境法，地方政府就会发现自己处境不妙了。

环境天平如今向对环境负责任的企业倾斜，而非污染企业。

供应链合规

总的来说，具有前瞻意识、主动使自身供应链合乎法规的企业将安然度过这些剧变。

9 月，舍弗勒集团大中华区总裁张艺林博士与浦东和嘉定两区政府联系，请求允许舍弗勒的钢丝供应

商继续运营三个月，以便给舍弗勒留出寻找替代供应商的时间。他估计，这家供应商的关停，将给舍弗勒及其价值链上其他相关企业造成3000亿元（454亿美元）的损失。

其他企业也开始对自己的供应商进行筛查，以便更好地了解自己的非直接弱点。

土壤修复：下一个目标？

迄今为止，大多数措施针对的都是空气和水污染，而土壤以及所有污染中隐蔽性最强的地下水污染通常被归入“治理难度太大”的类别。

几年前，一份外泄的全国土壤污染调查结果凸显了这一问题的严重性。这份调查也催生了“土壤十条”政策框架的出台和政府整合零散法规的决心。

政府并未食言。《土壤污染防治法》（草案）正在立法过程中，预计明年颁布，而且有关部门已经根据新的临时性法规对草案进行检验。

环保部2016年12月31日发布了《污染地块土壤环境管理办法》，该办法将从2017年7月1日起施行，

政府可以对污染风险最高的地块进行封锁或修复。

“修复规则”的实施，意味着“谁污染谁治理”的原则在中国将逐渐融入污染者的意识。

我们期待，更系统的环境调查和执法将缓解公众对于食品和水安全问题的强烈不安。

随着环境污染损害可以被量化，以及相关量化证据可以得到新的环境法庭的认可，企业将开始寻求使用各种方式分担环境责任。这将推动环境保险产品的增长以及环境技术的利用。

路线图

为了适应新形势，企业应该与他们的环境评估人员和法律顾问通力合作，开展内部审计，以避免在环境官员进行检查时出现下列危险情形：

- 环境/健康/安全（EHS）许可缺失或不全
- 不符合土地利用或产业政策
- 环境保护设施不足
- 由无资质者处理危险废物
- 任何土壤或地下水污染

- 挥发性有机物等发出的难闻气味
- 欠费或罚款
- 与临近居民或工厂存在争议
- 职业健康或安全赔偿问题
- 不合规问题被媒体或非政府组织曝光

目前严厉的环境执法很可能将成为常态。要防止恶性意外并充分展现出坚定的遵纪守法姿态，最好的方法就是企业主动进行自我评估并制定有力的合规政策。

中国开始了一个环境执法成为“新常态”的时代，中国这么做，将不仅为国内而且为其他地区的生态系统改善都做出巨大贡献。大多数西方在华企业将会克服困难，在适应了初期的冲击之后，获得更有力的市场地位，具有更强的竞争力。☞

孔·宏德 美国德汇律师事务所上海代表处执行合伙人、中美业务团队和清洁技术业务团队联合负责人

庄·博闻 上海格林曼环境技术有限公司企业服务及国际运营总监

Green enforcement is priority

A 'new normal' is emerging that favours environmentally responsible companies over polluters

□ Peter Corne Johnny Browaeys

A major campaign against environmental violations has so far penalised more than 30,000 companies and over 5,700 officials. Central government inspection teams have co-ordinated with multiple local government agencies in sweeps covering 30 provinces and regions.

What's more, this is not a one-off crackdown: China's central government has pledged to continue with biennial inspections.

President Xi Jinping signalled that officials should take environmental issues seriously in his lengthy speech to the 19th Party Congress in October: "The damage that humanity does to nature will ultimately harm humanity itself – this is an unavoidable rule," he said.

Recent legislation has given inspectors new tools and is amplifying the impact of the campaign. The next target will be air pollution in the Hebei-Beijing-Tianjin triangle.

The inspections represent a new paradigm in environmental enforcement in China, backed by laws with teeth, new legal and administrative infrastructure, and policy support from the highest level.

Gathering force

Few people fully appreciated the significance of Premier Li Keqiang's declaration of war against pollution in 2014, in response to Beijing's worsening "airpocalypse" smogs. However, Li's speech set in train a series of measures that are reversing the sense of helplessness and apathy surrounding environmental protection in China.

Environmental targeting was ramped up in the central government's subsequent Five Year Plan, and it has been clarified through 10-year environmental policy action statements – the "Air Ten", the "Water Ten" and, most recently, the "Soil Ten" – and long-awaited, stricter laws and regulations

“
‘ The damage that humanity does to nature will ultimately harm humanity itself ’
– President Xi Jinping

But it was the amended Environmental Law, which came into effect at the start of 2015, that promised to change an approach to the economy that has long favoured growth at any cost.

Potent legal measures

Enforcement authorities have enhanced tools to target environmental infringers, but also company senior managers and regulators.

The most potent of these measures changed the basis of fining infringers from a “per event” basis to a daily basis, drastically altering the “pollute vs comply” equation. Responsible senior managers could be thrown into administrative detention for up to 15 days at a time for repeated infringements by their company. And in associated rules, the career advancement of government officials was

made contingent on environmental performance.

To round out these changes, some non-governmental organisations (NGOs) are now qualified to bring public interest environmental lawsuits.

NGOs are driving compliance in other ways, too. In October, the well-respected Institute of Public & Environmental Affairs released its Corporate Information Transparency Index (CITI) at the 2017 China Green Supply Chain Forum, giving CITI performance/scores to approximately 260 brand-name companies.

Most multinational companies present expressed concern over increasingly stringent environmental regulations and enforcement that are presenting greater challenges for their supply chain management. Some shared their countermeasures, while others admitted to lacking experience and resources to make their supply chain compliant.



© Lu Guang/Greenpeace

Proactive self-assessment, combined with a strong environmental compliance policy, is the best way for companies to guard against nasty surprises

New paradigm

The changes underway represent a fundamental shift. Previously, environmental authorities focused on up-front approvals, with most attention paid to environmental impact assessments and construction approvals. The emphasis is now on corporate operational compliance and responsible oversight.

The law provides tools but without strong policy support it struggles as an instrument of social change. The succession of policy initiatives make clear that environmental enforcement is here to stay and on a par with anti-corruption as a government priority.

Other contributing factors are coming together too, such as the increase in trained staff in the environmental authorities and the growth of specialist environmental tribunals within the court system.

Shifting attitudes

A good example of this new paradigm and how far local government attitudes towards development have changed is the case of mighty packaging company Tetra Pak.

When it wanted to set establish itself in southern China 26 years ago, Foshan government offered a plot on a new industrial park a few miles out of town. Tetra Pak thrived. At one point, it had a 90% share of China's beverage paper packaging market and was for many years Foshan's largest taxpayer.

But as Foshan grew, Tetra Pak's factory, which was once out-of-town became swallowed by urban sprawl and surrounded by residents worried about air pollution.

This summer, after years of lobbying by angry locals – and a US\$100 million antitrust fine in 2016 – Tetra Pak

“The law provides tools but without strong policy support it struggles as an instrument of social change.”

transferred production to factories in Hohhot, Kunshan and Beijing.

Anxious international firms

The wave of enforcement makes no distinction between foreign and Chinese corporations. It set the phones ringing at China's foreign commercial chambers and other professional organisations with calls from affected firms calling for member events to share experiences and recommendations.

Corporations have also started performing more internal environmental audits to gain a greater level of comfort in the new environment.

End of local privilege

Sceptics may wonder if environmental compliance will regress as soon as the central inspectors return to Beijing. But another recent law is designed to prevent localities backsliding into a growth at all costs model.

The Environmental Tax Law turns discharge fees into a type of tax: monitoring and collection has been taken from the hands of local authorities and given to joint platforms set up by tax and environmental bureaus.

Local governments will find it risky to continue skirting around environmental law by waiving or subsidising the discharge fees of favoured local companies.

The environmental equation now favours environmentally responsible companies over polluters.

Supply chain compliance

Overall, corporations that pro-actively engage their supply chain over compliance are best able to weather the changes.

In September, Dr Zhang Yilin, CEO of Schaeffler Group Greater China, contacted the Pudong and Jiading governments asking them to allow his steel wire supplier to continue operations for another three months to give Schaeffler time to find alternative suppliers. He estimated the damage arising from the shutdown of this one supplier

to Schaeffler and subsequent companies in the value chain could be 300 billion yuan (US\$45.4 billion).

Other corporations have started screening their suppliers to better understand their indirect vulnerability.

Soil remediation next?

Most efforts so far have targeted air and water discharge pollution, with soil and groundwater contamination – the most insidious of all pollution – generally placed in the “too hard” category.

Several years ago, a leaked survey of the nation’s soil contamination highlighted the problem, prompting the Soil Ten policy framework and a government pledge to rectify fragmented regulation.

True to its word, the Law on Soil Pollution Prevention and Control (Soil Law) is on track to be promulgated next year. Already, new temporary rules are enabling authorities to test its concepts.

The Measures on Soil Environmental Management for Contaminated Sites – announced by the Ministry of Environmental Protection on December 31, 2016 and in effect from July 1, 2017 – mandate the sealing off or remediation of sites targeted by the government as those already at most risk of contamination.

The remediation rules mean that the polluter pays principal will gradually become entrenched in the consciousness of polluters in China.

We expect that the deep-seated public unease about the quality of food and water will be addressed through the advent of a more systematic approach to surveys and enforcement.

As the consequences of environmental contamination become quantifiable and acknowledged by the new environmental courts, companies will begin to seek apportioning liability. This will lead to the growth of environmental insurance products and promote the use of environmental technologies.

Roadmap

To adjust to the new environment, companies should work with their environmental assessors and legal counsel to audit themselves. This can guard against the following red flags that will be picked up in an investigatory visit by environmental officials:

- Absent or incomplete Environment, Health & Safety (EHS) permits
- Non-compliance with land use or industrial policy
- Inadequate environmental protection facilities
- Hazardous waste disposal by unlicensed parties
- Any soil or ground water contamination
- Noxious odours such as volatile organic compounds (VOCs)
- Outstanding fees or fines
- Disputes with neighbouring residents or facilities
- Occupational health or safety compensation issues
- Exposure by media or non-governmental organisations for non-compliance

The current rigour in environmental enforcement is likely to prevail. Proactive self-assessment, combined with a strong compliance policy, is the best way for companies to guard against nasty surprises, and to have a ready defence demonstrating robust environmental compliance policies.

By initiating an era in which environmental enforcement is the “new normal”, China will be making a massive contribution to improving ecosystems far beyond its own borders. Western companies will mostly weather the inconvenience and emerge from the initial investigatory shock in a stronger market position and better able to compete on their own terms. ☺

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“一个星球”峰会提出气候资金雄心

《巴黎协定》签署两周年之际，世界各国争相在绿色融资领域许下承诺。

□ 海伦娜·赖特

12月12日，来自全球的国家元首、市长和商界领袖齐聚巴黎，共庆《巴黎协定》签订两周年。在此次“一个星球”峰会上，与会的政府、银行、企业和投资机构都高调宣布了一系列有关气候金融的决策。

美国是唯一一个还未承认《巴黎协定》的国家。因此，据报道，特朗普总统并未受邀参加此次峰会。但从峰会的情况来看，特朗普的立场并未削弱全球气候行动。随着气候变化风险在全球议程上重要性不断提升，金融、商业以及政府也在不断加快行动步伐。

从煤炭转向清洁能源

其中一份重磅公告来自世界银行集团，它宣布自2019年起，停止对上游石油和天然气项目的投资。这份声明意义重大，因为根据最近的数据，在《巴黎协定》签署之后，世行仍在投资石油和天然气行业，2016年在化石能源勘探领域投资了约10亿美元。

淘汰煤炭的行动又添新的动力。英国和加拿大牵头成立的“弃用煤炭发电联盟”又吸纳了瑞典、加利福尼亚州以及24个企业界新成员。然而，该联盟面临的一个重大考验是能否争取到亚洲新兴经济体的加

入，后者正是新增煤炭投资集中的区域。

在另一份重要的公告中，23家最大的国家和区域开发银行同意调整自己的融资结构，使其与《巴黎协定》保持一致。国际开发金融俱乐部（IDFC）有69个成员国，麾下总资产超过4万亿美元（26.5万亿元人民币），其最大的成员——中国国家开发银行2015年的承诺资金达1300亿美元（8600亿元人民币）。

确保大型公共银行的投资与《巴黎协定》相一致，这一点意义重大。因为公共金融机构可以通过降低可持续项目的风险来促进社会资本对此类项目的投资。例如，印度国家银

“2020年“中国每一家上市公司都必须公开环境影响信息”。如果不采取措施，“一带一路”建设产生的排放量“可能是中国的三倍”。”

行突出强调了它与世界银行建立的一个新伙伴关系，旨在为屋顶太阳能发电系统提供新的信贷额度，从而鼓励更多投资进入该领域。

世界银行还宣布，将对高排放领域的所有项目中采用碳排放影子定价方法，将污染成本考虑在内。前美国国务卿约翰·克里将碳定价称为“我们（在应对气候变化方面）能做的最重要的一件事”。

中国也是峰会的一大焦点。绿金委主任马骏表示，到2020年“中国每一家上市公司都必须公开环境影响信息”。中国的清洁能源装机容量占全球三分之一，但“一带一路”倡议中海外投资对气候产生的影响也令人担忧。马骏承认，如果不采取措施，“一带一路”建设产生的排放量“可能是中国的三倍”。

私营部门的行动

私营部门也做出了大量承诺，将从化石燃料领域撤资。法国保险业巨头安盛（AXA）将逐步停止对新的煤炭建设项目承保，荷兰银行（ING）将在2025年之前停止煤炭项目贷款。

全球投资者还启动了“气候行动100+”五年计划，以控制排放。令人印象深刻的是，加入此计划的机构资产总额超过26.3万亿美元（174万亿元人民币）。

2017年是绿色金融的发展机遇期，全球绿色债券发行量达到1000亿美元（6620亿元人民币），汇丰银行最近推出全球首个10亿美元的可持续发展债券（66.2亿元人民币）。

英格兰银行行长马克·卡尼透露，已有230多家公司承诺与“气候相关金融信息披露工作组”合作。这些公司的总市值超过6.3万亿美元（417亿元人民币）。工作组建议企业披露有关危害性投资的信息。据卡尼说，如今这一举措正在“成为主流”。

全球最大的养老基金——日本“政府养老投资基金”（GPIF）宣布了一个减少温室气体排放的“基于科学的目标”。日本的目标是到2020年有100家公司制定这一目标，以确保实现化石燃料领域投资的缩减。

城市的发展机遇

这些新的举措为快速发展的亚洲城市带来了新的机遇。“全球市长盟约”成员包括东亚和南亚的34个城市，人口占全球总人口的10%以上。该组织宣布与世界银行建立新的气候伙伴关系，在全球150个城市投资45亿美元（300亿元人民币）。欧洲复兴开发银行在推出绿色城市气候融资加速器项目之后，还将大力投资于城市建设。

今年以来，加勒比海几个岛屿遭受了前所未有的飓风袭击，其领导人计划创建世界上第一个“气候智能区”，实施规模高达80亿美元（530亿元人民币）的计划，其中包括100%使用可再生能源。而哥斯达黎加、埃塞俄比亚、德国和瑞典等14个国家也着眼未来，承诺出台计划，争取在2050年前达到碳中和。

最后，中国有望很快启动碳排放交易计划。作为全球领先的能源融资主体，中国是实现《巴黎协定》目标的关键。在这些开发银行、投资者和保险公司的高调承诺之后，全球的目光将转向中国，以及其为绿色金融体系和海外绿色投资所做出的努力。☺

海伦娜·赖特博士，英国智库E3G高级政策顾问

Climate finance at French summit

The Paris Agreement's second anniversary was met with numerous commitments on green investment

□ Helena Wright

On December 12, global heads of state, mayors and business leaders gathered in Paris to celebrate the second anniversary of the Paris Climate Agreement. The One Planet Summit featured a range of high profile announcements on climate finance from governments, banks, business, and investors.

The United States is the only country not to have accepted the Paris Agreement so President Trump was reportedly not invited. But the summit shows that Trump's position has not dampened global climate action. With the risks of climate change rising on the global agenda, momentum continues to build in finance and business, as well as by governments.

Shifting from coal to clean

One of the headline announcements was from the World Bank Group, which will stop investing in upstream oil and gas from 2019. This matters because according to recent data, it continued to spend on oil and gas after the Paris deal, investing around a billion dollars in fossil fuel exploration in 2016.

Momentum to phase out coal was also given a boost. The "Powering Past Coal" alliance led by the UK and Canada added Sweden and California to its membership, plus 24 new businesses. However, a major test will be whether it

can sign up an emerging economy in Asia where much new coal investment is located.

In another major announcement, the 23 largest national and regional development banks agreed to align their finance with the Paris Agreement. The International Development Finance Club (IDFC) represents over 69 countries and holds assets of more than US\$4 trillion (26.5 trillion yuan). Its largest member is China Development Bank, which had US\$130 billion (860 billion yuan) of commitments in 2015.



French President Emmanuel Macron celebrates with UN general secretary António Guterres and World Bank president Jim Yong Kim

Ensuring that finance from large public banks is in line with Paris is essential because public institutions can help to boost private investment in sustainable projects by reducing risks. For example, the State Bank of India highlighted a new partnership with the World Bank to provide new lines of credit for rooftop solar energy, which should encourage more investment in the sector.

The World Bank also announced it will apply a shadow carbon price on all projects in high-emitting sectors to take account of pollution costs. Former US Secretary of State John Kerry described pricing carbon as the “single biggest thing we can do” on climate change.

China was also in the spotlight at the summit. Top green finance official Ma Jun said that by 2020 “every listed company in China must disclose information on environmental impacts”. China may have a third of the world’s installed clean energy capacity, but the climate impacts of its overseas investments through its Belt and Road Initiative are causing concern. Ma Jun acknowledged that emissions from the Belt and Road “could be three times China’s emissions” if nothing is done.

Private sector actions

There were numerous pledges from the private sector on pulling funding out of fossil fuels. French insurance giant AXA will phase out insurance for new coal construction projects and Dutch Bank ING will end coal lending by 2025.

Global investors also launched the five-year Climate Action 100+ to curb their emissions. Impressively, investors with more than US\$26.3 trillion (174 trillion yuan) in assets have signed up.

2017 has been a year of green finance opportunities, with global issuance on green bonds reaching US\$100 billion (662 billion yuan) and HSBC recently launching the world’s first US\$1 billion sustainable development bond (6.62 billion yuan).

Bank of England governor Mark Carney, revealed more than 230 companies have committed to the Task Force on Climate-related Financial Disclosures, representing a

market capitalisation of over US\$6.3 trillion (41.7 billion yuan). The Task Force recommends companies reveal information about harmful investment, which Carney said is now “entering the mainstream”.

Japan’s pension fund GPIF, the largest pension fund in the world, announced a “science based target” to reduce greenhouse gas emissions. Japan is aiming for 100 companies to have such a target by 2020, ensuring a reduction in fossil investments.

Opportunities for cities

The new initiatives pose opportunities for Asia’s fast-growing cities. Signatories of the Global Covenant of Mayors, which include 34 cities in East and South Asia, represent more than 10% of the world’s population. This group announced a new climate partnership with the World Bank to invest US\$4.5 billion (30 billion yuan) in 150 cities around the world. The European Bank for Reconstruction and Development will also invest heavily in cities following the launch of its Green Cities Climate Finance Accelerator.

With unprecedented hurricanes devastating several Caribbean islands this year, their leaders will now create the world’s first “climate smart zone” to implement an ambitious US\$8 billion (53 billion yuan) plan, including 100% renewable energy. And thinking long term, Costa Rica, Ethiopia, Germany and Sweden were among 14 countries promising to develop plans to be carbon neutral by 2050.

Finally, China is expected to launch its emission trading scheme soon. As the world’s leading energy financier, China is pivotal to achieving the Paris Agreement. After these high-profile announcements by development banks, investors and insurers, attention will now turn to China and its efforts to green both its financial system and overseas investments. ☺

Dr Helena Wright is a senior policy advisor at thinktank E3G.

中美天然气“管道外交”的气候视角

中美新签署的数百亿美元天然气订单对气候变化来说意味着什么？

□ 白莉莉



美国总统特朗普偕同第一夫人梅兰妮亚出访北京，与习近平主席和彭丽媛会晤

从蒙大拿牛肉到波音飞机，中美两国昨天在特朗普的首次对华国事访问期间旋风般签署了大量经贸协议。

一方面，中美两国在朝鲜半岛和贸易问题上的紧张关系还在持续；另一方面，天然气已成为关乎两国共同利益的一个领域。此次中美签署

的能源协议金额高达 1400 亿美元，占美商贸代表团此次签署协议总金额的一半，其中大部分来自于中方购买美方的液化天然气(LNG)。

但是，正当中国参加波恩联合国气候谈判之时，这些交易不禁让人产生疑问：中国如此大力扩展天然气消费，还能够兑现其气候承诺吗？

过去十年，中国的天然气需求翻了两番还多。由于国内易于开采的天然气资源有限，近年来中国一直都在关注储量丰富的美国页岩气。2016年，中国约35%的天然气需求靠进口来满足，主要来源国是卡塔尔和澳大利亚，但美国也逐渐占有一席之地。

比煤炭更清洁

国际能源署的《世界能源展望2016》指出，预计到2040年，液化天然气贸易量将翻番，主要是受美国对华出口的推动。

保尔森基金会的研究顾问安德斯·霍夫说，天然气“价格太低，液化天然气市场供过于求，但我认为这一情况很快就会改观。如果中国大力推进华北地区的供暖和工业燃料煤改气转型的话，中国的液化天然气进口将会再创新高。”

中国的《能源发展“十三五”规划》号召用天然气和可再生能源替代煤炭。根据该规划，2020年天然气在中国一次能源中的比例将从2015年的5.9%增长到10%。如果

把眼光放得更远，中国的《能源生产和消费革命战略（2016-2030）》中则提出，到2030年要将天然气在中国能源结构中的比重提升到15%。

2015年，煤炭在中国能源消费总量中的比例下降了2个百分点，降到62%，丢失的份额被可再生能源和天然气所代替。能源基金会（美国）北京办事处的卫梵斯和邹骥评论说：“美国对华液化天然气出口通过帮助中国加速煤改气的步伐，有助于中国改善空气质量和向低碳未来转型。”

中国国家发改委能源研究所和其他机构2016年的建模研究表明，一直到2050年天然气都将是能源转型的一大动力。只要按照当前政策走下去，并且利用高成本效益技术，中国的排放将在2025年达到峰值，之后便会逐渐下降。天然气的需求尽管会在2045年达到峰值，但到2050年仍将在中国的能源体系中发挥强有力的作用。

长期意义

有些专家认为，天然气是中国应该避免踏入的一个“死胡同”。尽管相比煤炭天然气带来的坏处要小，但燃烧起来仍会排放温室气体，并且推广使用天然气也必须投入大量

资金建设寿命期长的基础设施。各国已经承诺到本世纪末实现碳中和，因此继续使用天然气需要对排放出的碳进行捕获与封存。

中美达成的最新能源协议的确会减少中国的二氧化碳和本地空气污染，但同时也要求美国扩大出口能力来增加对华的液化天然气出口，这会使美国被锁定在更多的化石燃料基础设施中。

美国投资建设煤制天然气工厂也令人关切。中国正在推动利用其深层煤炭储量生产合成气，但这一过程的能源强度很高。

美国自然资源保护协会(NRDC)中国气候与能源政策主任林明彻认为，这些能源协议的属性和签署的时机发出了错误的信号。他说：“鉴于联合国气候大会目前正在波恩举行，此次会议的主题是落实《巴黎协定》和尽快推进向低碳能源转型，所以中美的能源协议令人失望。”

“特朗普及其政府也应该像中国一样，充分认识到作为可再生能源和低碳能源科技领跑者所带来的巨大商机。”

白莉莉，中外对话气候问题专员，北京能源网络(Beijing Energy Network)执行董事

Pipeline diplomacy

President Trump's inaugural visit to China has resulted in major deals on natural gas

□ Lili Pike

From Montana beef to Boeing jets, China and the US struck a flurry of deals yesterday during President Trump's inaugural state visit.

As tensions continue to simmer over North Korea and trade, natural gas has emerged as an area of mutual interest for the two countries. Energy agreements, mostly for US liquefied natural gas (LNG) reached US\$140 billion, half of the total signed by the US trade delegation.

But as China negotiates at the UN climate talks in Bonn, the deals are raising questions about whether China can expand consumption of gas whilst meeting its climate commitments.

Natural gas demand in China has more than quadrupled in the past decade. Lacking easily accessible sources domestically, China has been eyeing the abundant supply of US shale gas in recent years. Approximately 35% of China's 2016 natural gas demand was met by imports – mainly from Qatar and Australia, but the US has also been gaining a foothold.

At least five deals were signed during Trump's Beijing visit. The agreements include the first long-term agreement for the

export of LNG from the US to China by Cheniere Energy, an initiative to develop Alaska's gas production, LNG exports to China from Delfin Midstream, Chinese investments in a West Virginia shale gas development, and the construction of a coal-to-syngas production facility in China.

Cleaner than coal

According to the International Energy Agency's 2016 World Energy Outlook, LNG trade is expected to double by 2040, mainly on the back of exports from the US to China.

Anders Hove, research consultant at the Paulson Institute noted that natural gas "prices are too low and LNG markets are oversupplied, but I think that perception will change quickly if China's push to switch heating and industry in northern China to gas results in another banner year of LNG imports."

China's 13th Five-Year Plan for Energy calls for natural gas and renewable energy to replace coal consumption. The plan sets a 2020 target for natural gas

to provide 10% of primary energy, up from 5.9% in 2015. Looking farther ahead, China's Energy Production and Consumption 2016-2030 Strategy calls for natural gas to provide 15% of the country's energy by 2030.

Coal's share of total energy consumption fell by 2% to 62% in 2016, displaced by renewable energy and natural gas. "LNG exports from the US to China could contribute to China's efforts to improve air quality and transition to a low-carbon future by quickly switching from scattered coal to gas," commented Vance Wagner and Zou Ji of Energy Foundation China.

Modelling conducted in 2016 by China's Energy Research Institute and others, shows natural gas contributing to China's energy transition through to 2050. Under their model, which is based on current policies and cost-effective technology, China's emissions would peak in 2025 and continue to drop thereafter. Natural gas demand would plateau in 2035 but still play a strong role in the energy system until 2050.

Long-term implications

Some experts argue that natural gas is a "cul de sac" that China should avoid. Although burning it is less harmful than coal, natural gas still emits greenhouse gases, and promoting it would require significant investment in long-lived infrastructure. Countries have committed to

becoming carbon neutral by the end of the century so the continued use of natural gas would require emissions to be captured and stored.

The recent set of deals, while reducing CO2 and local air pollution in China, would also require the US to expand export capacity to increase its LNG exports to the country, locking the US into more fossil-fuel infrastructure.

The US investment in a coal-to-syngas plant is also concerning. China is pushing to utilise its deep coal reserves to produce gas but this process is highly energy intensive.

The nature and timing of the energy deals sends the wrong signal, according to Alvin Lin, climate and energy policy director of the Natural Resources Defense Council in China. "This is disappointing given the UN climate conference happening now in Bonn, which is focused on implementing the Paris Agreement and pushing forward the transition to low carbon energy sources as rapidly as possible.

"Trump and his administration would do well to recognise, as the Chinese have, the enormous business opportunities in leading the race on renewables and low carbon energy technology." ☞

Lili Pike is a strategic climate communications specialist for chinadialogue and the executive director of the Beijing Energy Network.

从奥巴马到特朗普： 中美气候合作路在何方？

特朗普首次访华之际，卫梵斯和邹骥的分析显示，我们有理由对中美气候与清洁能源合作的前景保持乐观。

□ 卫·梵斯 邹骥

在美国总统特朗普开启他的首次访华之旅之前，中国气候变化事务特别代表解振华呼吁美国“重回《巴黎协定》的大家庭”。他的话不禁让人回想起奥巴马政府时期中美气候与清洁能源合作的“黄金时期”。

习主席和时任美国总统奥巴马将气候变化问题称为双边关系的一个“支柱”，双方围绕这一议题发表了一系列联合声明，扩大了中美双方在能源和环境领域的合作。与此同时，中美两国所展现出来的领导力也被认为是推动2015年12月《巴黎协定》通过的催化剂。

但特朗普总统却改弦更张，宣布美国将退出《巴黎协定》，并缩小和重新调整了中美关系的整体重心。

那么由此带来了哪些变化？未来几年，中美关系将如何发展？

气候问题重要性降低

奥巴马政府期间，气候变化问题几乎是每次中美高层对话的重要议题，其中也包括两国首脑会谈及中美战略与经济对话等内阁级别的会议。

然而，特朗普对于内阁成员的任免、其在国内采取的一系列举措、及其本人的言论都表明，在任何语境下，他都没有将气候变化看做是威胁或是需要优先考虑的问题，包括在外交领域。

美国缩窄了与中国的合作范围，选择在更小尺度上开展对话，着重

讨论贸易和朝鲜半岛问题等少数几个优先级高的议题，从而进一步降低了气候变化问题出现在最高级别会谈中的可能。

中国也不太可能在此次中美高层对话中谈及气候变化问题，因为中国高层领导人可能会把重心放在稳定双方整体关系上。

继续合作的领域

气候变化问题地位的降低的确让人深感担忧。不过，还是有理由保持乐观。

首先，工作层面的气候和清洁能源合作仍在继续。中美在气候变化、清洁能源和环境保护等领域共



特朗普访问中国，气候问题很可能不再是优先议题

同举办了数十个技术和政策交流会、研讨会、试点项目和合作研究。尽管气候变化并未列入中美高层对话的议程，但上述合作项目多数都制定了多年期工作计划，并且在特朗普的任期内也将延续下去。

例如，第八届中美能效论坛上个月在丹佛举行。中美清洁能源联合研究中心的五个合作领域仍然定期举办研讨会和技术对话。而在小布什总统时期就开始的中美绿色合作伙伴项目今年征询了新的建议书，上个月又宣布结成三个新的合作伙伴关系。

甚至美国环保署也继续与中国保持着合作，并于2017年5月在天津与中方联合举办了“中美绿色港口与船舶国际论坛”。

但是，缺少了高层的关注，一些近期中美举办的气候活动也黯然失色。今年夏天，由于联邦政府的支持不足，波士顿市长马蒂·沃尔什取消了原定的中美气候变化和城市会议。后来他重新宣布这是一次国际会议，而非双边会议。

但是取消会议的情况只是个例，不具有普遍性。在一些情况下，中美同行多年来一直开展着具有建设性的合作，共同推进有利于两国和有助于解决气候问题的政策和技术方案。这种信任和合作的意愿仍在继续。

其次，美国非联邦政府成员仍然致力于气候行动，其中包括与中国的合作。虽然美国联邦政府从全球气候领袖的位置上退下来，但美

国各城市、各州、企业、慈善机构和民间组织却挺身而出。

诸如“我们仍在守约”（WeAreStillIn）、“美国气候联盟”和“气候市长”这样的倡议向中国和全世界发出信号，表明许多美国人仍然致力于采取积极的气候行动，如“美国承诺”便力图量化和传递这些承诺。

加州在推动中美之间现有的气候合作行动方面尤其活跃，该州与中国在气候变化、清洁能源和环境方面签订了十几个合作协议。加州州长杰里·布朗今年夏天会见了中国国家主席习近平，共同探讨了气候变化合作与行动。

最后，中国仍然致力于国内和国际的气候行动。一方面美国在气候变化问题上领导地位已经瓦解，

另一方面中国则多次声明会履行其《巴黎协定》的气候承诺，并继续推进国内的脱碳进程。

中国是世界上最大的可再生能源投资国，风能和太阳能装机容量均居世界首位，并且还有着世界上最大的电动汽车市场。为推动可再生能源市场的发展，中国最近出台了世界上首个国家层面的新能源汽车配额制度，并正在研究彻底淘汰汽油车和柴油车。本月底，中国计划启动世界最大的国家碳排放交易体系。

明日可待

我们可以期待的是，中美工作层面上的气候和清洁能源合作仍将继续下去，但与“气候”相比，“能源”问题的关注度更高。

特朗普政府一方面在大力推动化石燃料的发展，另一方面则取消了“气候变化”的提法。因此，与单纯与气候相关的项目相比，现有中美合作项目中与解决化石燃料相关问题有关的项目(如中美清洁能源联合研究中心的清洁煤炭技术联盟和中美石油和天然气工业论坛)，未来几年可能会获得更多的关注和资源。

只要还有资金支持，我们预计大部分现有的项目仍将继续——当然也许在必要的情况下会保持低调。

在一些能源领域，如液化天然气(LNG)、风能、核能和碳捕集等，

以及能源相关的经济对话方面，我们或许还能看到中美合作不断扩大。

在中美全面经济对话百日行动计划中，液化天然气贸易是特朗普政府迄今为止在中美关系问题中唯一具体提及的能源相关问题，这会是一个扩大中美合作的前景广阔的领域。

除了平衡双边贸易外，美国对华出口液化天然气还有助于中国改善空气质量，并通过“煤改气”加速其低碳转型的进程。

考虑到美国驻华大使泰里·布兰斯塔德在担任艾奥瓦州州长时，曾成功地推动了风能的发展，因而未来两国有可能会扩大风能领域的合作。

美国能源部长里克·佩里六月访问北京期间，重点提到两国在核能和碳捕集领域有着非常大的合作潜力。

从广泛的层面来讲，特朗普政府可能会从清洁能源转型和 / 或能源贸易的经济影响入手，找到扩大与中国对话的机会。

奥巴马政府时期，双方关于气候与清洁能源的合作与对话之所以宝贵，不仅是因为其内容本身具有重要意义，还因为两个最具影响力的国家展开了具有建设性的合作，这向世界传递了积极的信号，并且成为整个中美关系的一个亮点。

随着中美关系的新阶段步入成熟，有一些初步迹象表明，特朗普政府也认识到了这些积极事件的外交价值。例如，2017年9月的中美社

会和人文对话就将“环境”一甚至包括“应对气候变化问题”作为合作领域之一。

不管联邦政府层面会如何作为，美国非联邦行为主体的国际行动将会不断扩大和增强。地方政府、企业、技术开发人员、民间组织、慈善机构及其他非联邦行为主体在创造和扩大低碳投资、贸易和研发等新的增长引擎方面发挥着重要作用。

特别值得一提的是，加州仍将继续发挥其国际领导力。而由州长杰里·布朗主持即将于2018年9月召开的全球气候行动峰会则会进一步巩固加州在该领域的领导地位。届时我们期待看到中国更强有力的参与。

我们也期待其他各州(包括在清洁能源领域与中国有着悠久的历史华盛顿州在内)通过与中国合作等方式提升自己的国际形象。

作为政府和政府附属机构的前高级官员，我们深信中美在气候变化问题上的持续合作是十分宝贵，也是十分必要的。

在中美双边关系的新时期，我们认为有充分的理由对中美气候与清洁能源合作的强劲前景保持乐观。⁵

卫梵斯，能源基金会中国战略合作总监，曾任美国国务院气候变化特使办公室中国事务顾问

邹骥，能源基金会北京办事处总裁，曾任国家发展和改革委员会国家应对气候变化战略研究与国际合作中心副主任

US-China: climate cooperation

As Trump arrives in China,
we ask how the climate and energy relationship is changing

□ Vance Wagner Zou Ji

In advance of President Trump's first visit to Beijing on Wednesday, Xie Zhenhua, China's special representative for climate change affairs, expressed hope that the US would "come back to the big family of the Paris Agreement" and called for renewed US-China cooperation in clean energy.

His comments are a reminder that US-China climate and clean energy cooperation was a high-profile success story during the Obama administration. Calling climate change a "pillar" of the bilateral relationship, President Xi and then-President Obama issued a series of joint presidential statements on climate change and expanded US-China energy and environmental engagement. In parallel, US-China leadership was seen as a catalyst for the Paris Agreement in December 2015.

But President Trump has changed course. He's announced his intention to withdraw the US from the Paris Agreement, and narrowed and re-ordered overall priorities in the US-China relationship.

So what's changed? And what direction might the relationship take over the next few years?

Climate less of a priority

Climate change was a prominent feature of nearly every senior US-China dialogue during the Obama administration, including presidential summits and cabinet-level meetings such as the Strategic and Economic Dialogue.

However, under President Trump, the US is unlikely to make climate change a priority issue in high-level dialogues with China. President Trump's appointments, domestic actions, and own words indicate that he does not see climate change as a threat or a priority issue in any context, including diplomatic.

At the same time, the US has reduced the breadth of its engagement with China, opting to focus on a few high priority issues, such as trade and the Korean peninsula, through smaller-scale dialogues, further reducing the likelihood that climate change will come up at the highest levels.

China is also unlikely to raise climate change in high-level US-China dialogues at this time, with senior Chinese officials likely to focus on stabilising the overall relationship.

Areas of continuity

This downgrading of climate change in the overall US-China relationship is deeply concerning. Nevertheless, we see reasons to be optimistic.

Firstly, working-level climate and clean energy cooperation continues. The US and China share dozens of ongoing technical and policy exchanges, workshops, pilot projects, and joint research related to climate change, clean energy, and environmental protection. Most have multiple-year work plans that have continued into the Trump administration, even though climate change is not on the agenda for high-level US-China dialogues.

For example, the 8th US-China Energy Efficiency Forum was held last month in Denver. The five tracks of the US-China Clean Energy Research Center still hold regular workshops and technical dialogues. And the EcoPartnerships programme, begun under the George W Bush administration, solicited new proposals this year and announced three new partnerships last month.

Even the US Environmental Protection Agency has continued to engage with China, including by co-convening the US-China Green Ports and Vessels Initiative in Tianjin in May 2017.

Without high-level attention, some recent US-China initiatives have faded. This summer, Boston Mayor Marty Walsh cancelled a planned US-China meeting on climate change and cities because of insufficient federal government support. He later re-announced it as an international, rather than bilateral, meeting.

But these cancellations are exceptions, not rules. In some cases, US and Chinese counterparts have been working constructively together for years to advance policy and technology solutions that are beneficial to both countries and to the climate. This trust and willingness to partner continue.

“This downgrading of climate change in the overall US-China relationship is deeply concerning.”

Secondly, US non-federal actors remain committed to climate action, and that includes working with China. As the US federal government retreats from a global climate leadership position, American cities, states, businesses, philanthropies, and civil society actors are stepping up.

Initiatives like WeAreStillIn, the US Climate Alliance, and Climate Mayors signal to China and the entire world that many in America remain committed to ambitious climate action, as America’s Pledge seeks to quantify and communicate these commitments.

California has been particularly active in pushing ongoing US-China momentum for climate cooperation; the state has well over a dozen cooperative agreements with China on climate change, clean energy, and the environment, and California Governor Jerry Brown met with President Xi this past summer to discuss climate change cooperation and action.

Finally, China remains committed to climate action, both domestically and internationally. As US leadership on climate change has splintered, China has repeatedly affirmed its intention to fulfil its climate commitments under the Paris Agreement, and continues to push its domestic decarbonisation agenda.

China is the world’s largest renewable energy investor, now boasting the greatest installed wind and solar capacities, and electric vehicle market. To boost this market, China recently adopted the world’s first-ever national zero emission vehicle mandate, and is researching banning gasoline and diesel cars altogether. Later this month, China plans to launch what is expected to be the world’s largest national emissions trading system. Even as the US federal government abandons its climate policies, we see no evidence of China slowing down its transition to a low carbon economy.

What to expect

We expect working-level US-China climate and clean energy cooperation to continue but “energy” will receive the most attention compared to “climate”.

The Trump administration has promoted fossil fuels while

eliminating references to “climate change.” Accordingly, existing US-China cooperation addressing fossil fuel-related issues (such as the CERC’s Advanced Coal Technology Consortium and the US-China Oil and Gas Industry Forum) is likely to achieve greater attention and resources over the coming years than explicitly climate-related programmes.

Nevertheless, we expect that most existing programmes will continue – with a low profile if they have to – for as long as funding remains.

We may see expanded US-China cooperation in a few energy areas, such as liquefied natural gas (LNG), wind, nuclear, and carbon capture, as well as expanded energy-related economic dialogue.

LNG trade, included in the 100-Day Action Plan of the US-China Comprehensive Economic Dialogue, is the only specific energy-related issue to have been mentioned so far by the Trump administration in the US-China context, and is a fertile area for expanded US-China engagement.

In addition to balancing overall bilateral trade, LNG exports from the US to China could contribute to China’s efforts to improve air quality and transition to a low-carbon future by quickly switching from scattered coal to gas.

There may be opportunities for expanded cooperation on wind, given US Ambassador to China Terry Branstad’s successful wind legacy from when he was governor of Iowa.

Nuclear energy and carbon capture were also flagged as opportunities by US Department of Energy Secretary Rick Perry during his visit to Beijing in June.

More broadly, the Trump administration may find opportunities for expanded dialogue with China related to the economic impacts of the clean energy transition and/or energy trade.

During the Obama administration, cooperation and dialogue on climate and clean energy were valuable not just for their content but because they produced positive news about the world’s two most influential nations working

constructively together, and served as a bright spot in the overall US-China relationship.

As this new phase of the US-China bilateral relationship matures, there are some early signs that the Trump administration also recognises the diplomatic value of such positive stories. For example, “environment” – even including “addressing climate change issues” – was mentioned as a cooperative area outcome of the US-China Social and Cultural Dialogue in September 2017.

Regardless of what happens at the federal level, international action by US non-federal actors will expand and increase in profile. Local governments, businesses, technology developers, civil society, philanthropies, and other non-federal actors have major roles to play in creating and enlarging the new growth engines of low-carbon investment, trade, and research and development.

In particular, California’s international leadership will continue, culminating in September 2018 at Governor Jerry Brown’s Climate Action Summit, at which we expect robust Chinese participation.

We also expect that other states, such as Washington, which already has a strong history of clean energy engagement with China, will expand their international profiles, including by working with China.

As former senior government and government-affiliated officials, we believe in the value – indeed, the imperative – of ongoing US-China engagement on climate change.

In this new era of the US-China bilateral relationship, we see reasons to be optimistic that US-China climate and clean energy cooperation will remain strong. ☺

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Zou Ji is the president of Energy Foundation China and former deputy director general of the National Center for Climate Change Strategy and International Cooperation under the National Development and Reform Commission of China.

气候变化给全球带来 沉重公共卫生代价

医学研究发现，中国是受全球变暖健康影响最大的国家之一。

□ 凯瑟琳·厄尔利



气候变化已经导致人们被迫迁移，是造成至少4400人背井离乡的唯一原因

医学杂志《柳叶刀》发表的一份报告表明，中国亟需提升公共卫生在制定气候变化政策中的优先地位。

这份报告由来自世界银行、世界卫生组织和清华大学等 26 个机构的医生、学者和政策制定者共同撰写，是“柳叶刀倒计时：健康和气候

变化追踪”项目的成果之一。该项目旨在让人们更好地了解健康与气候变化行动的必要性。

研究发现，气候变化已经对全

世界人口的健康产生了影响，如洪水、热浪、传染病的大面积扩散、营养不良率的升高、空气污染引发的疾病等。研究还强调了其更加广泛的经济影响，例如劳动生产率降低、人口迁徙和非自愿移民。

作者们认为中国已经制定出很多政策来应对气候变化，包括提升能效等改革工业和能源体系的措施。

逐步淘汰煤炭的各项政策也有效地减少了空气污染。比如，全国年度人口加权平均 PM2.5 浓度下降了 21.5%，从 2013 年的每立方米 60.5 微克降低到 2015 年的每立方米 47.5 微克，同时期 PM2.5 引发的死亡减少了 9.1%。

但作者们也指出，决策者必须将健康与其他政策考量放在同样重要的地位，如温室气体减排、技术和经济成本以及社会心理承受力。这样可以使气候变化减缓和适应措施的健康效益最大化。

报告中援引了道路的例子。上海和广州 20% 以上的颗粒物空气污染来自尾气排放，北京的这一数字超过 30%，深圳更是高达 40% 以上。因此，报告认为中国应该制订更多政策来控制城市地区的机动车数量。

报告还指出，中国还要进一步研究气候变化政策如何能够减少疾病。比如，1909 年以来中国的平均地表温度升高了 0.9 摄氏度到 1.5 摄氏度，而

这可能导致了蚊子分布范围的扩大。

有“明确且一致”的证据表明，1950 年以来由两种蚊子传播的登革热、黄热病和寨卡等疾病在中国的传染率升高。作者们预测，2015 年 -2030 年这两种蚊子的疾病传播率将进一步升高 1.5%-1.7%。

报告认为，尽管中国已经建立了一个完善的突发卫生事件应急体系，但仍需对疾病的起因进行更深入的分析 and 理解，尤其是气候变化在其中发挥的作用。专家们指出，这样中国可以采取更多以预防为导向和更具成本效益的对策来解决突发卫生事件。

报告还强调了气候变化对全世界人类健康的许多其他影响。从 2000 年到 2016 年，受热浪影响的人数增加了约 1.25 亿人，其中 2015 年暴露人口达到创纪录的 1.75 亿人。

2000 年以来，温度上升造成农村劳动生产率平均下降 5.3%。2016 年，温度上升造成全球超过 92 万人失业，其中单是印度就有 41.8 万人。

报告认为气候变化最大的健康影响是营养不良。全球温度每上升 1 摄氏度，便导致小麦产量减少 6%，水稻产量减少 10%。那些营养不良最严重的地区也是预计受气候变暖影响减产率相对较高的地区。

气候变化已经导致人们被迫迁移，是造成至少 4400 人背井离乡的

唯一原因。到 2050 年，全球可能会有 2500 万到 10 亿人因海平面上升、海岸侵蚀、以及降水和温度的变化而迁移。报告认为，如此大规模的被动移民将有可能给他们的精神和生理健康带来严重影响。这种影响既包括直接的影响，也包括因打乱基本的卫生和社会服务而带来的影响。

但作者也强调，尽管前景充满挑战，但我们有机会把一场正在迫近的卫生突发事件变成“本世纪公共卫生领域最大的进展”。

作者认为，有效地减缓气候变化将带来各种效益，包括减少空气污染引发的疾病，摄入营养更高的膳食，确保能源、粮食和水安全，以及减少贫困。

《联合国气候变化框架公约》(UNFCCC) 前执行秘书克里斯蒂安娜·菲格雷斯如今担任“柳叶刀倒计时”高级顾问委员会主席，她说这份报告表明解决气候变化可以“直接、明确、立即”改善全球人类健康。

菲格雷斯说：“大多数国家在制定落实《巴黎协定》的气候规划时，并未把握上述机会。我们必须做得更好。医生叮嘱我们注意保健时，我们会听从建议；政府也应如此。”

凯瑟琳·厄尔利，自由撰稿记者，《环境学家》前副主编

Floods, heatwaves & diseases to rise

China is one of the most exposed countries to the health impacts of global warming, finds health study

□ Catherine Early

China urgently needs to make public health a higher priority when designing policies to tackle climate change, according to a report published in medical journal *The Lancet*.

Doctors, academics and policy makers from 26 global health institutions including the World Bank, World Health Organisation and Tsinghua University collaborated on the report under the *Lancet Countdown* project, which aims to ensure that the case for action on health and climate change is better understood.

The research finds that climate change is already affecting the health of all populations worldwide, with impacts including flooding, heatwaves, increased spread of infectious disease, growing rates of undernourishment and malnutrition, and sickness caused by air pollution. It also highlights broader economic impacts such as reduced labour capacity, population displacement and involuntary migration.

Looking at China, the authors note that it has developed many policies to address climate change, including making changes to industrial and energy systems, such as improving energy efficiency.

Policies to phase out coal have also reduced exposure to air pollution, for example, the population-weighted annual mean PM2.5 concentrations decreased by 21.5% throughout China from 60.5 micrograms per cubic metre ($\mu\text{g}/\text{m}^3$) in 2013, to 47.5 $\mu\text{g}/\text{m}^3$ in 2015. Deaths attributed to PM2.5 pollution decreased by 9.1% over the same period, according to the report.

However, the authors state that health should be as high a priority as the other considerations of policymakers, which are typically reducing greenhouse gas emissions reduction, technical and economic costs and social acceptability. This will maximise the health benefits of climate change mitigation and adaptation, they say.

The report gives the example of road transport, which contributes more than 20% of total air pollution from particulate matter in Shanghai and Guangzhou, more than 30% in Beijing and more than 40% in Shenzhen. More policies are needed to constrain vehicles in urban areas, it states.

Further research is also needed to better understand how policies to address climate change can reduce disease, according to the report. For example, the mean surface

temperature in China has risen by 0.9°C to 1.5°C since 1909, which may have increased the range mosquitos.

There is “clear and consistent” evidence that the rate at which two types of mosquito have spread diseases such as dengue, Yellow Fever and Zika in China has increased since 1950, and the authors predict that the rate of disease spread by these two mosquitoes could rise by a further 1.5% and 1.7% between 2015 and 2030.

Although China has set up a good response system to health emergencies, further analysis and better understanding of the causes are needed, especially the role of climate change, the report states. This will enable more prevention-oriented and cost-effective strategies to deal with it, the experts said.

The report highlights many other impacts of climate change on human health worldwide. Between 2000 and 2016, the number of people exposed to heatwaves increased by approximately 125 million, with a record 175 million exposed in 2015.

Productivity of rural labour has fallen by an average of 5.3% since 2000 as a result of rising temperatures. In 2016, this effectively took more than 920,000 people out of the workforce globally, with 418,000 of them in India alone

The biggest health impact of climate change identified by the report was undernutrition. Each 1°C rise in global temperature has caused a 6% decline in global wheat yields and a 10% fall in rice yields. The regions with the highest vulnerability to undernutrition are also areas where yield losses due to climate warming are predicted to be relatively high, the authors noted.

Climate change is already forcing people to migrate, and is the sole contributing factor for at least 4,400 people who have already moved. Rising sea levels, coastal erosion and changes in rainfall and temperature will mean that between 25 million and one billion people globally will need to leave their homes by 2050. Such migration has potentially severe impacts on mental and physical health, both directly and by disrupting essential health and social services, the report found.

However, the authors stress that though the outlook is challenging, there is an opportunity to turn a looming medical emergency into “the most significant advance for public health this century”.

Mitigating climate change effectively will bring benefits including reducing illness caused by air pollution; delivering more nutritious diets; ensuring energy, food and water security; and alleviating poverty, the authors believe.

Christiana Figueres, chair of the Lancet Countdown’s high-level advisory board and former executive secretary of the UN Framework Convention on Climate Change, said that the report shows that tackling climate change “directly, unequivocally and immediately” improves global health.

“Most countries did not embrace these opportunities when they developed their climate plans for the Paris Agreement. We must do better. When a doctor tells us we need to take better care of our health we pay attention and it’s important that governments do the same,” she said. ☞

Catherine Early is a freelance journalist and the former deputy editor of the environmentalist.

海洋：不可忽视的气候拯救力量

海洋不仅有着超乎想象的发电潜力，还可以大量吸收二氧化碳。
激活“蓝碳”空间已成为这个时代最紧迫的任务之一。

□ 保罗·赫乐图斯

今年，美国南部、加勒比海以及其他一些地区都遭遇了破坏性极强的极端天气事件。在提供人道主义援助和灾后重建的同时，更为关键的是积极利用创新方法减少二氧化碳排放，从而在长远角度降低产生这些灾害的风险因子。

太阳能发电和储能技术的创新正在稳步推进，并将成为解决上述问题的重要手段之一。但是，在目前有关气候变化的辩论中，人们对于海洋现状以及应用中的海洋技术却关注甚少。

海洋占地球表面积的 71%，是一个相互连通的全球性生态系统，与地球气候系统相互影响、密不可



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印度尼西亚洪水中顽强生长的红杉树幼苗

分。例如，海洋浮游生物释放的氧气占地球总量的一半以上，人类活动产生的二氧化碳有 25% 被海水所吸收，每年排放到大气中的 90% 的多余热量也由海洋所吸收。

我们可以、也必须扩大当前视野，在海洋中寻找气候变化的各种解决方案，特别是具有提供低碳能源以及封存大气中碳的巨大潜力。

海上风力发电正显现出它终将大规模改变电力行业碳足迹的潜力。与陆上风电相比，海上风电的风力更强，更加平缓 and 稳定，发电潜力更大。全球来看，截至 2016 年年底，全球已经有 111 个海上风电项目投入运营，装机容量接近 1300 万千瓦。预计 2017 年全球新增海上风电装机容量将超过 2015 年 400 万千瓦的纪录。

欧洲发展海上风电已逾 20 年，装机容量从 2010 年的不到 300 万千瓦增长到 2016 年的累积超过 1170 万千瓦。此外，美国和亚洲等新市场的表现也十分强劲。

欧盟的目标是到 2020 年和 2030 年将海上风电容量分别提升至 4000 万千瓦和 1.5 亿千瓦。显然，加大投资、推动全球海上风电产业快速大规模发展是全球海洋工作的重要任务之一。

目光转到海面以下，全球的海浪、洋流、潮汐、温度梯度等估计每年的发电潜力高达 2 万太瓦时——超过目前全球发电总容量。

很多设备正在测试当中，但从工程角度来说，如何在严酷的海洋环境中使它们长期保持正常工作状态是一大挑战。中短期来看，潮汐能和波浪能是最有可能做出最大贡献的海上发电技术。东北大西洋地

区是发展海洋能潜力和需求最大的地区，欧洲拥有全球最多的开发机构（全球 52% 的潮汐能开发机构和 60% 的波浪能开发机构都在欧洲）。海洋能源是远期低碳能源组合中的重要一环，但要让这些能源真正为人所用，则还有很多工作要做。

大气二氧化碳浓度一直在不断增长。《巴黎协定》要求通过利用负排放技术（NET）去除大气中的二氧化碳，并用安全并且环保的方法封存起来，以确保二氧化碳水平不超过地球安全承载极限。

虽然人们对于那些有潜力的陆上 NET 技术给予了很大关注，但有证据显示，海洋在全球碳循环和存储中发挥着最主要的作用，这意味着我们必须认真审视基于海洋的负排放技术，将全球海洋广大的立体空间作为我们捕捉二氧化碳、刻不容缓地填补减排差距的强有力的机遇。

海洋及其生态系统已经可以捕捉将近四分之一的由人类活动所产生的二氧化碳。这些碳中的一部分通过光合作用被有机物捕捉后存储于海底沉积物当中。搞清如何保持并增强海洋从大气中吸收碳的能力是气候变化科学和政策最为迫切的挑战之一。

在近海区域，健康的红树林、潮汐湿地以及海草草甸可以发挥重要作用，将大气二氧化碳封存，即变成“蓝碳”。这些生态系统还是能够帮助海岸生物抵御极端天气事件的重要栖息地，是一个能够为我们带来双赢的重要机遇。

然而，每年全球有大约 1.5% 的蓝碳生态系统遭到破坏，这意味着其所能提供的服务也随之丧失。不

仅如此，生态系统的破坏使得本已隔离起来的碳突然又被释放出来，这些蓝碳生态系统进而成为了温室气体一大排放源。维持和恢复蓝碳生态系统是应对气候变化的一项简单而行之有效的方法，是获得碳抵消信用，并同时投资于碳封存和海岸生态系统恢复能力的良机。

人们也正在探索化学和生物形式的海洋负排放技术，如改变海洋酸碱度（在海水中加入重碳酸盐）；（向海床以及水柱体中）直接注入二氧化碳；种植海藻用于深海沉积；以及调整海洋初级生产力（例如人工上涌、增加氮和 / 或磷等宏量营养素、添加铁和硅等微量元素、增强透光度、促进固氮蓝藻生长等）。

我们需要快速并谨慎地采取行动评估海洋负排放技术，例如确定潜在海洋负排放技术的状态和影响；识别研究缺口以及未知问题；评估实施成本；研究法律框架；探索未来可同时捕捉二氧化碳、生产食物、发电以及其他海洋功用的多功能海洋负排放技术站点的概念设计等。

世界海洋委员会（WOC）正召集科学、政策、商业以及其他领域的力量，增强研究人员、私人企业以及公共部门之间的协调交流，帮助世界推动海洋低碳能源的发展，以及蓝碳和海洋负排放技术解决方案的开发。⁵

保罗·赫乐图斯，世界海洋委员会创始总裁和首席执行官

Ocean solutions overlooked

The ocean has enormous potential to help produce low-carbon energy and sequester atmospheric carbon

□ Paul Holthus

With the devastating extreme weather events in the southern United States, the Caribbean, and elsewhere this year, it is ever more vital that, while providing humanitarian support and restoring communities, we do not lose sight of innovative solutions to cutting CO₂ that can help reduce the long-term risk from such crises.

Solar power and energy storage innovations are advancing steadily and will be an important part of our tool kit. However, far too little attention has been paid in the climate change debate to what is happening in our seas and the technology that is being employed there.

The ocean, which covers 71% of the planet, is a global, interconnected ecosystem that is closely intertwined with our planet's climate system. For example, ocean phytoplankton produce more than 50% of our oxygen, and the ocean absorbs more than 25% of the anthropogenic CO₂, and 90% of the excess heat emitted annually into the atmosphere.

We can and must look beyond our current horizon to see the ocean as a source of solutions to the climate change challenges facing our planet. In particular, the ocean

has enormous potential to help by producing low-carbon energy and by sequestering atmospheric carbon.

Offshore wind is proving itself as the energy source for changing electricity's carbon footprint at scale and in time. Ocean winds blow harder, smoother, and steadier than land-based wind, providing higher potential for electricity generation. Globally, the offshore wind energy sector had nearly 13 gigawatts from 111 operating projects at the end of 2016. Projections for 2017 indicate expected global new capacity additions to be above the record of four gigawatts of new offshore wind installed in 2015.

The European offshore wind industry is more than 20 years old and has grown from less than three gigawatts in 2010 to a cumulative installed base of more than 11.7 gigawatts in 2016, and new markets in the United States and Asia are coming on strong.

The European Union (EU) has a target of 40 gigawatts of offshore wind power capacity by 2020 and 150 gigawatts by 2030. Investing in what it takes to advance offshore wind rapidly and at scale is clearly a global ocean priority.

Meanwhile, below the surface, the world's ocean waves,

currents, tides and temperature gradients are estimated to potentially provide 20,000 terawatt hours of electricity per year — more than the entire current global generation capacity.

Many devices are being tested, but the engineering challenges for technology to survive for long periods in the harsh marine environment present challenges. Tidal and wave energy are those poised to provide the most significant contribution in the short- to medium-term. Some of the greatest potential and need for ocean energy is in the Northeast Atlantic, with Europe hosting most of the global developers (52% of tidal stream and 60% of wave energy developers). Ocean energy is a major strand in the long-term tapestry of low-carbon energy, but much needs to be done to bring these sources to the energy pipeline.

All the while, CO₂ levels have continued to rise. The Paris Agreement requires negative emission technologies (NETs) to remove CO₂ from the atmosphere to a safe and environmentally sound storage in order to meet planetary safe limits.

Although there is much attention paid to potential land-based NETs, evidence that the ocean is the dominant player in global carbon cycling and storage means that ocean-based NETs must be given serious consideration for the great three-dimensional mass of the global ocean as a formidable opportunity to capture CO₂ in the service of humanity's ever more urgent carbon mitigation gap.

The ocean and its ecosystems already capture nearly a quarter of human-produced CO₂. Some of this carbon is picked up by organisms through photosynthesis and later stored in sediments. Figuring out how to maintain and enhance the ocean's ability to appropriately absorb carbon from the atmosphere is one of the most pressing immediate climate change science and policy challenges.

Close to shore, healthy mangrove forests, tidal marshes, and seagrass meadows can play a significant role in sequestering atmospheric CO₂ as “blue carbon”. These ecosystems are also a critical habitat for ensuring coastal resilience to extreme events, creating an important “win-win” opportunity waiting to be harnessed.

Unfortunately, approximately 1.5% of global blue carbon ecosystems are destroyed each year, meaning the services of these ecosystems are lost. They can then become a significant source of greenhouse gas emissions, as locked up carbon is suddenly released. Maintaining or restoring blue carbon ecosystems is a simple and effective method for combating climate change and creating opportunities for carbon offset credits and investment in both carbon sequestration and coastal resilience.

Chemical and biological ocean NETs are being explored, including: ocean alkalinity shifts (introducing bicarbonates); direct CO₂ injection (seabed and water column); growing seaweed for deep ocean deposition; and adjusting ocean primary productivity (e.g. artificial upwelling, addition of macronutrients — nitrogen and/or phosphorus — addition of trace elements such as iron and silicon, enhanced light penetration, promoting the growth of nitrogen fixing cyanobacteria).

Major efforts are needed to rapidly, but carefully, evaluate ocean NETs, e.g. determining the status and impact of potential ocean NETs; identifying research gaps and unknowns; reviewing the cost of implementation; reviewing the legal framework; and exploring the conceptual design of a future multipurpose ocean NET station for capturing CO₂, producing food, generating power, and hosting with other ocean uses.

The World Ocean Council (WOC) is bringing together science, policy, business, and other interests to enhance co-ordination and exchange among researchers, private enterprises, and public bodies to help the world advance low-carbon energy from the ocean and develop blue carbon and ocean NET solutions. ☺

Paul Holthus is the founding president and CEO of the World Ocean Council.

WTO 废止捕鱼补贴刻不容缓

各国贸易部长必须按照承诺在 2020 年前逐步取消渔业补贴。
中国作为全球渔业补贴最高的国家，责任尤其重大。

□ 费尔明·库普

12月10日至12月13日，世界贸易组织第11届部长级会议将在布宜诺斯艾利斯召开，这也是该会议首次在拉丁美洲国家举行。

与往常一样，此次会议将汇集全球各国的贸易部长、谈判代表以及数千名商界和民间团体的领导人。今年大会的核心任务是要达成一项国际性协议，遏制有害的渔业补贴，也就是那些对全球渔业产能过剩、过度捕捞以及非法捕鱼（IUU）负有责任的政府补助或税收减免。

有关取消渔业补贴的讨论已经进行了20多年，世界贸易组织的164个成员国希望达成一个约束性协议，彻底消灭这些补贴。如果今年

所有国家能做出新的、强有力的承诺，那将有利于最终达成一个令人期盼已久的协议。

环境咨询机构瓦尔达集团负责人雷米·帕尔芒杰告诉中外对话：“我们现在必须要拿出一项决议，否则，世贸组织在可持续发展方面所做的承诺就将遭到质疑。如今，有太多的渔船竞相对日益匮乏的渔业资源展开争夺。”

如果达不成一项决议，世贸组织在可持续发展方面所做的承诺就将遭到质疑。

全球每年的渔业补贴总额高达350亿美元左右（约合人民币2320亿元）。据欧洲议会渔业委员会称，在

这350亿美元中，有200亿美元（约合人民币1320亿元）以燃油补贴和免税项目等形式补贴给了大型捕捞船队，从而提高他们的捕捞能力。

加强渔业管理能够在一定程度上控制船队规模扩张对日益减少的渔业资源的影响，但是，实际情况是，相关监管措施很少得到有效落实，这导致渔业资源陷入过度捕捞的局面。

联合国粮农组织2016年的《世界渔业和水产养殖状况报告》（SOFIA）显示，全球经过评估的鱼类存量中，有大约60%被完全开发，大约30%已经被过度开发。

有关专家和不少发展中国家都认为，渔业补贴极大地扰乱了全球



一艘围网渔船在太平洋海面兼捕作业时捕获了一条鲸鲨

渔业市场秩序，同时也是导致渔业资源枯竭的主要原因之一。

然而，发展中国家还是想保留补贴政策，因为他们认为这些补贴能够帮助低收入、资源贫乏的渔民维持生计。

迫在眉睫

阿根廷非政府组织“野生生物”（Vida Silvestre）的海洋项目主管杰尔勒莫·卡涅特对中外对话说：“如果没有补贴，很多船只就不会出海作业了。目前的海洋环境根本无法承受现在的这种压力，大多数资源已经处于完全开发状态。”

在联合国 2015 年通过的“可持

续发展目标”（SDGs）的第 14 条中，有一项内容就是要在 2020 年前彻底取消渔业补贴，以更好地保护和可持续利用海洋与海洋资源。

2017 年 6 月召开的纽约联合国海洋大会上重申了世界贸易组织在实现这一目标过程中的作用。世贸组织副总干事艾伦·沃尔夫表示，取消渔业补贴将成为“布宜诺斯艾利斯大会的首要议题”，不过大会可能会给予较低收入国家一些特惠待遇。

商业咨询机构 DNI 负责人兼贸易专家马赛洛·艾利赞多表示：“自 2016 年在内罗毕召开的上届大会以来，渔业补贴就已经被列入世界贸易组织的议事日程。对于阿根廷而言，这也是一个重要的问题。作为本

次大会的主席国，阿根廷很有可能会推动达成某种协议。”

国家利益

帕尔芒杰表示，欧盟、日本、中国、美国和俄罗斯是全球渔业补贴最多的地区和国家。其中，亚洲地区的补贴是最多的。

欧洲委员会的一项研究显示，中国的渔业补贴总额远远高出其他国家。2011 年到 2013 年，中国每年的渔业补贴为 56 亿欧元，其中九成是船只燃油补贴。

其次是美国，它在 2013 年的渔业补贴总额为 16 亿欧元；然后是韩国，它在 2014 年的渔业补贴总额为

15 亿欧元；日本和俄罗斯分列第四和第五位，2015 年的补贴额分别为 12 亿欧元和 2500 万欧元。

绿色和平组织的调查显示，中国拥有全球规模最大的远洋渔业船队，2016 年远洋渔船数量超过 2900 艘。帕尔芒杰表示：“中国是一个贸易大国，是世贸组织的关键参与者之一。我们希望中国能够支持有关削减渔业补贴的讨论。”

主要提案

在本次大会召开前，世贸组织成员国已经提出了 7 项渔业提案。虽然这些提案都不约而同地认为有必要取消渔业补贴，但在实施方法和改革范围方面，各国的意见却各有不同。

中国提议有选择地取消一些涉及非法捕捞的渔业补贴，但是在要求其缩减大型渔业捕捞船队的压力面前却并不退让。中方主张发展中国家在补贴淘汰措施方面可以得到豁免，并且主张不把有领土争议的地区包括在内。中方希望由各国政府和地方渔业组织，而不是专家，来决定什么才是非法、无报告和无管制的捕捞活动。

挪威、欧盟、全球最不发达国家、几个拉丁美洲国家、新西兰、冰岛和巴基斯坦也都提出了自己的提案。

这些国家之所以有着不同的立场，部分原因是这样一个协议将对他们产生不同的影响。取消渔业补贴可能会对发展中国家的手工或小规模渔业从业者产生负面影响，如果政府取消了税收减免和资金扶持政策，他们最容易受到波及。

其实，大型渔业公司得到的补贴是小型公司的 4 倍，而过度捕捞

与其中 60% 的补贴有干系。

不列颠哥伦比亚大学最近的一项研究显示，燃油补贴在渔业补贴中份额最大，而这其中又有 96% 是通过船用柴油补贴的方式分配给了大型渔业公司。由于柴油发动机的购置与维护成本太高，大多数小型渔船都选择使用汽油，而汽油的补贴额度并不太高。

国际贸易与可持续发展中心（ICTSD）环境与自然资源项目负责人爱丽丝·蒂平告诉中外对话：“目前各方对需要取消的补贴种类还有较大争议。另外，关于发展中国家成员可以得到哪些豁免，各方也是说法不一，比如小型渔业公司能否继续享受渔业补贴。”

不过，所有提案都认为应该禁止对无报告和无监管的捕鱼进行补贴，并禁止对过度捕捞地区的渔业进行补贴。

由布鲁姆协会（Bloom）和瓦尔达集团（Varda Group）联合撰写的一个题为《垂首可得的鱼》的报告认为，上述两个禁止措施最有可能成为协议的基础。

但是，补贴取消的范围仍然存在很多争议。关于应该如何限制渔业活动，所有 7 项提案的建议都不相同。

民间团体和海洋专家希望协议中有专门针对过度捕捞的条款，从而与联合国的可持续发展目标保持一致，同时还要包括防止产能过剩的内容，因为产能过剩是造成渔业资源枯竭的主要原因之一。

有足够证据显示，应该将取消渔业补贴的政策拓展到整个海域。换句话说，就像有些提案建议的那样，不应该将逐步取消补贴的政策限定在某些地域范围内。

过度捕捞是一个全球性问题，因此，如果我们只针对某些地域采取行动，将无法对跨界和迁徙性渔业资源进行切实保护和可持续利用。

卡涅特表示：“发展中国家是渔业产品的供应国，发达国家从发展中国家进口了大量的渔业产品。而那些拥有船舶工业的国家也不希望这个行业走向没落，所以才希望继续推行补贴政策。”

“我们必须围绕渔业活动监管展开讨论，因为目前生产的船只数量已经超过了海洋的承受能力。”

蒂平表示，各方谈判代表正在起草协议草案。不过由于各成员国意见仍然无法统一，所以草案中可能只有几个方面是各方的共识。

最终的协议将是一份部长决议，其中将再次确认世界贸易组织成员国为达成全面停止渔业补贴的目标而继续展开谈判的承诺。

蒂平表示，如果协议最终无法达成，各国也可以依据更为广泛的政治承诺，停止某些极为过分的补贴品种，为将来签署某种承诺留下空间。⁵

费尔明·库普，阿根廷记者，致力于环境报道

WTO must end fish subsidies

Trade ministers must deliver on pledge to phase out fishing subsidies by 2020.
As the world's biggest payer, China's role is crucial

□ Fermín Koop

Meeting for the first time in Latin America, the World Trade Organization's 11th Ministerial Conference will take place in Buenos Aires from 10-13 December.

As usual, it will bring together trade ministers, negotiators and thousands of business and civil society leaders. Central to this year's talks will be an international deal to curb harmful fishing subsidies. These are government payments or tax breaks that contribute to overcapacity, overfishing and illegal fishing (IUU) globally.

The 164 member countries of the World Trade Organization (WTO) will aim for a binding agreement to eliminate these subsidies, an issue that has been under discussion for more than two decades. This year, a strong, renewed commitment from all actors could help to achieve an urgently-needed deal.

"It is time to come to a resolution. If not, the credibility of the WTO regarding its commitment to sustainable development will be questioned. There are too many vessels competing for an increasingly exploited stock of fish," Remi Parmentier, director of environmental consultancy The Varda Group, told *chinadialogue*.

Subsidies paid to the fishing industry amount to around US\$35 billion per year (232 billion yuan). Of this, US\$20 billion (132 billion yuan) are given in forms that enhance the capacity of large fishing fleets, such as fuel subsidies and tax exemption programmes, according to the European Parliament's Committee on Fisheries.

Proper management of fisheries can go some way to curb the impact of fleet expansion on dwindling resources, but measures are rarely enforced effectively, meaning fisheries are overexploited.

Around 60% of the world's assessed fish stocks are fully exploited and 30% are already overexploited, according to the 2016 SOFIA report, published by the United Nations Food and Agriculture Organization.

Experts claim, along with many developing countries, that fisheries subsidies significantly distort global fish markets and are a major contributing factor to the depletion of resources.

However, developing countries want to protect subsidies, which they say support the livelihoods of low-income, resource-poor fishermen.

Tipping point

“There are a lot of boats that would not be working now if it they hadn’t received subsidies. The oceans can’t keep up with the pressure they are now facing, most of the resources are being fully exploited,” Guillermo Cañete, marine programme coordinator at Vida Silvestre, an Argentine non-governmental organisation (NGO), told chinadialogue.

The Sustainable Development Goals (SDGs) established in 2015 by the United Nations agreed to eliminate fishing subsidies by 2020 as part of the SDG 14, which aims to conserve and sustainably use the oceans and marine resources.

The role of the WTO in achieving this was reiterated in June 2017 at the UN Ocean Conference held in New York. WTO deputy general director Alan Wolff said eliminating fishing subsidies would be the “priority in Buenos Aires”, although preferential treatment may be given to lower income countries.

“Fishing subsidies have been in the agenda of the WTO since its last meeting in Nairobi [in 2016]. For Argentina, it’s an important issue and since it’s chairing the summit it’s possible to have some kind of agreement,” said Marcelo Elizondo, trade expert and head of business consultancy DNI.

National interests

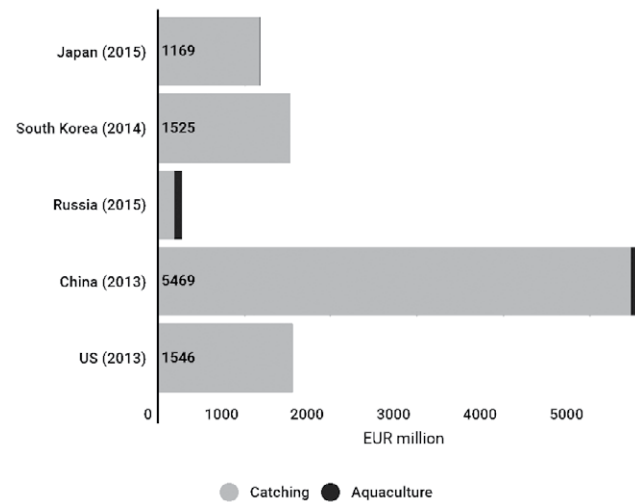
The European Union, Japan, China, the United States and Russia spend the most on fishing subsidies, according to Permentier, who emphasised the role of Asia as the largest regional contributor of subsidies.

According to a study from the European Commission, China pays more in fishing subsidies than any other country. From 2011-2013 it spend an average of 5.6 billion euros per year; with 90% of subsidies going on ship fuel.

Second is the US, which paid 1.6 billion euros in 2013; followed by South Korea 1.5 billion euros in 2014; Japan 1.2 billion euros in 2015; and Russia 25 million euros.

China has the world’s largest distant water fishing fleet, with more than 2,900 vessels in 2016, according to Greenpeace. “China is a major trade power and a key

Total subsidy values by country (EUR million)



Data source: Directorate-General for Maritime Affairs and Fisheries (European Commission), Published January 201

actor in the WTO. We hope it will be supportive of these discussions,” said Permentier.

Main proposals

head of the meeting, WTO members filed seven proposals on fishing. Although the proposals contained a consensus on the need to eliminate subsidies, countries’ proposed methods of implementation and reform limits varied.

China has filed a proposal to selectively ban subsidies for illegal fishing but is resisting pressure to curb its vast fleet. Its proposal seeks to exempt developing countries from all phase out measures and leave out areas subject to territorial disputes. It wants national governments and regional fishing organisations, rather than experts, to determine what constitutes illegal, unreported and unregulated fishing.

Norway, the EU, least-developed countries, several Latin American countries, New Zealand, Iceland and Pakistan have also issued proposals.

The difference in position held by countries is partly explained by the varying impacts such a deal would have on these groups. Ending fishing subsidies could have a negative effect on artisanal or small-scale fishermen from developing countries, who are the most vulnerable to the

withdrawal of government pay outs and exemptions.

In fact, large-scale fisheries receive about four times as much in subsidies than their small-scale counterparts, with up to 60% of those subsidies promoting overfishing.

The largest such subsidy is fuel subsidies, 96% of which are given to the large-scale fisheries through marine diesel subsidies, according to a recent study by the University of British Columbia. Because of the high cost of purchasing and maintaining diesel motors, most small-scale fisheries vessels run on gasoline, which is not as heavily subsidised.

“There are still significant differences of position regarding what kinds of subsidies should be prohibited. And what, if any, exceptions might be granted for subsidies provided by developing country WTO members. For example, for small-scale fishing,” Alice Tipping, head of the International Centre for Trade and Sustainable Development (ICTSD) Environment and Natural Resources programme, told chinadialogue.

All proposals on the table include the prohibition of subsidies linked to unreported and unregulated fishing and to the exploitation of already overfished stocks.

These two prohibitions are thought to be leading candidates for the basis of an agreement, according to the report *Low Hanging Fish* by Bloom and The Varda Group.

However, the scope of the subsidy removals is still highly contested. All seven proposals suggest different approaches to limiting types of fishing activity.

Civil society groups and marine scientists have called for the agreement to contain a clause on overfishing so it complies with the SDGs, as well as a provision on preventing overcapacity as this contributes greatly to the depletion of fish stocks.

There is a strong case for extending the prohibition of subsidies to the entire ocean. In other words, not limiting a phase out to specific geographic areas, as some proposals have suggested.

Overfishing is a global problem so geographical limitations could present obstacles for the conservation and sustainable use of straddling and migratory fish stocks.

“Developing countries are the suppliers of fish to developed countries, which import large amounts. Countries that have a naval industry don’t want to see it go away so they continue pushing for subsidies,” Cañete said.

“Discussions have to be framed in regulating the fishing activity. The oceans’ capacity is exceeded by the number of boats that are currently manufactured.”

According to Tipping, negotiators are working on a draft agreement, which would include only a few areas of common ground due to the remaining differences among member states.

A final deal, in the form of a Ministerial Decision, would re-confirm WTO members’ commitment to continue negotiations towards comprehensive rules on fisheries subsidies.

If there’s no deal, countries can still include action in their broader political commitments to stop providing specific egregious kind of subsidies, Tipping said. This, at the very least, would keep the door open for some kind of commitment being signed. ☺

Fermin Koop is an Argentine journalist, specialising in the environment with experience across diverse publications.

渔业的“中国方案” 对环境意味着什么？

农业部提出海洋捕捞产量“负增长”指标能否为近海捕捞赢得喘息的机会？

□ 周薇



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大西洋几内亚比绍海域，福远渔127号船上的网师正在清洗捕获的鲨鱼

12月9日，中国农业部渔业渔政管理局副局长韩旭在北京表示，中国一方面需要发展渔业来改善人们食物的营养成分、解决食物供给问题，另一方面也需要管理和控制渔业、不让渔业破坏海洋

生态——中国可以在这两方面为世界提供一个“中国方案”。

渔业过度捕捞已经成为全球最严峻的海洋问题之一。联合国粮农组织统计全球90%的鱼类资源已经遭到过度捕捞或充分捕捞，渔业资

源的衰退将对数亿依赖海洋为生的人口粮食和生计带来威胁。

作为海洋捕捞量占世界总量18%的全球最大渔业国家，中国也面临着严重的过度捕捞。中国农业部的数据显示，2016年中国近海海

洋捕捞总产量达 1328 万吨，远超过渔业专家建议的 800-900 万吨的最大可捕量。

此次韩旭副局长提出的“中国方案”，正是为了应对和缓解持续数十年的过度捕捞，给中国近海海洋生物多样性和海洋生态系统提供喘息和恢复空间。这个方案提出了三个具体的目标：

一、到 2020 年，将中国的捕捞能力降低 15%，其中渔船数量减少 2 万艘、渔船马力削减 150 万千瓦；

二、削减 309 万吨捕捞产量，将捕捞总量控制在 1000 万吨以下；

三、对非法、未报告、未受管制的捕捞行为（以下简称 IUU 捕捞）采取“零容忍”态度。

中国海洋机动捕捞船总量为 18.7 万艘，包括 2600 艘左右远洋捕捞船，减少 2 万艘渔船，意味着超过 10% 的近海渔船数量削减。而刚刚公布的《十三五全国远洋渔业发展规划》也为远洋渔船数量设置了上限（到 2020 年不超过 3000 艘）。而“中国方案”中减少的 309 万吨捕捞产量，大约相当于日本全国一年的海洋捕捞产量。

这是中国渔业管理历史上针对海洋捕捞产量和渔船数量功率所提出的“最硬指标”，如果切实落到实处，产量的“负增长”除了有利于海洋生态之外，也能带来捕捞业经济效益的“正增长”。尽管中国海洋捕捞产量常年高居全球第一，捕捞总量也保持稳定，然而在“船多鱼

少”的现状下，渔船的捕捞效率实际上非常低下，近海渔获物更是表现出明显的“低值化”倾向。

绿色和平 2017 年发布的《中国海洋幼杂鱼捕捞现状及对中国可持续渔业发展的启示》（以下简称《报告》）显示，保守估计，包括各种捕捞类型在内，中国近海渔获物中 30% 为体型过小、种类太杂而无法食用的“幼杂鱼”，每年的总重量接近 400 万吨，超过日本全国一年的海洋捕捞产量。

但如果降低捕捞能力、加强渔业管理，经济鱼类的幼鱼就有更大的概率能够长大、繁殖，不仅市场价值将增加数十甚至上百倍，也更有利于渔业资源状况的恢复。

中国近海资源的衰退在很大程度上催生了远洋渔业的快速扩张，因此，如果近海过度捕捞状况得到改善，也将有助于疏解远洋渔业产能过剩的问题。中国拥有全球最庞大的远洋船队，渔船数量约 2600 艘。然而，以阿根廷军警击沉中国渔船和“加拉帕戈斯鲨鱼案”为代表的系列备受国际社会关注的事件说明，中国远洋渔业企业在“走出去”的过程中，无论是对入渔国当地法律法规的遵守的意愿还是能力都亟待提高，中国远洋渔业的发展模式也亟待改变。而对 IUU 捕捞的“零容忍”态度，显示了中国政府规范有序发展远洋渔业的意愿。

实际上，明确目标之后，更大的挑战将来自于政府部门能否辅之以

更完善的政策法规、更严格的执法和监管，来保障目标的顺利实施。在这方面，中国的渔业管理部门已经开始了一系列行动，包括调整国内渔船的燃油补贴政策，开展限额捕捞试点工作等。不过，要彻底解决持续几十年的过度捕捞问题，实现鱼业的健康持续发展，需要做的工作还有很多。

首先，渔业管理需建立在科学的基础之上，然而基础资料的缺乏一直是限制中国渔业管理发展的短板，因此，优化基础捕捞数据的统计和收集、加强渔业行业的可追溯性建设、增强信息的透明公开等工作需要持续加强；其次，水产养殖被视为缓解捕捞压力的解决方案，但中国水产养殖生产过程中需要消耗大量野生渔业资源，水产养殖行业的饲料需求进一步加剧了幼杂鱼的过度捕捞，因此，水产养殖行业的可持续转型也需同步进行；最后，应以法律法规的形式确立各项管理措施，将“突击行动”式执法活动逐步落实为常态化的监管模式，并逐步统一各地方渔业管理的措施和力度，避免地区间的差异为违法行为制造可乘之机。☺

周薇，绿色和平资深海洋项目主任，绿色和平“中国海洋幼杂鱼捕捞现状及对中国可持续渔业发展的启示”项目负责人

China to reform fisheries

Will a new plan for the fishing industry provide respite for dwindling fish stocks?

□ Zhou Wei

China has announced a plan to tighten control its fishing industry to limit environmental damage, with implications for the health of oceans globally.

On December 9, Han Xu, deputy head of the fishing management bureau at the Ministry of Agriculture said in Beijing that the government intends to reduce the size of its domestic fishing fleet and crackdown on illegal fishing operations with a “zero tolerance” approach.

Overfishing is one of the gravest issues facing the world’s oceans. The UN Food and Agriculture Organisation (FAO) estimates that 90% of the world’s stocks are fully fished or overfished, threatening the food supply and livelihoods of hundreds of millions of people.

China accounts for 18% of the global catch, more than any other nation, and faces major overfishing challenges in its coastal waters. Data from the Ministry of Agriculture shows that 13.28 million tonnes of fish were caught from the country’s coastal fishing grounds in 2016. This was far more than the recommended maximum sustainable catch size of eight to nine million tonnes referred to by Ministry of Agriculture officials, suggested by experts.

The ministry’s new “China Plan” aims to stop decades of overfishing and allow the coastal environment and biodiversity to recover. The plan has three specific aims:

- 1) Reduce China’s fishing capacity by 15% by 2020, with 20,000 fewer vessels.
- 2) Reduce China’s catch by 3.09 million tonnes, to no more than 10 million tonnes.
- 3) A zero-tolerance policy on illegal, unreported and unregulated (IUU) fishing.

Distant water fleets

China has 187,000 fishing vessels, including about 2,600 working in distant waters. Retiring 20,000 would reduce the number of coastal fishing vessels by more than 10%. Plans for the distant water fishing fleet during the 13th Five-Year Plan period will see such vessels limited to no more than 3,000 as of 2020. The reduction in catch of 3.09 million tonnes is equivalent to Japan’s entire fishing catch.

It is important that China’s government has made reduction in fishing catch a binding target. If it succeeds,

it would benefit the environment while increasing industry profitability. The size of China's catch has not increased with that of its fleet. Instead, more fishing vessels have been chasing fewer fish, reducing efficiency and profits.

Small fish

Conservative estimates say 30% of China's coastal fishing catch is made up of small fish of various species that have no food value. These "trash fish" total four million tonnes a year, more than Japan's entire catch.

Reducing fishing capacity and better regulation of the industry will allow the young of commercial species to reach maturity and breed, thereby increasing their market value by ten or even one hundred times. It will also help fishing stocks to recover.

The decline of China's coastal fisheries has spurred growth in the country's distant water fishing fleet, which is now the world's largest at about 2,600 vessels. The recovery of coastal fisheries will help reduce pressure and overcapacity in the distant water fleet.

Sustainable development

China urgently needs to reform how this fleet operates, as demonstrated by a number of closely-watched international incidents, such as the Argentine coastguard shooting at Chinese vessels and the Galapagos shark haul. The zero-tolerance policy on IUU fishing indicates the Chinese government wants to see the industry develop in a regulated and orderly manner.

The bigger challenge will be the improved policies and laws and tougher enforcement and oversight needed to realise the new targets. The fishery authorities have already taken action, including reducing fuel subsidies for domestic fishing vessels and trials of fishing quotas. But overfishing has been happening for decades and achieving healthy growth for the industry will require much more work.

Recommendations

First, management of the industry needs a scientific basis, which is currently hampered by a lack of basic data monitoring. Improvements to the gathering and analysis of catch information, traceability and transparency are necessary.

Second, aquaculture is seen as reducing pressure on marine fisheries but in reality consumes huge quantities of wild fish as fodder and increases the catch of juvenile fish. Aquaculture must also become more sustainable.

Finally, the management of fisheries requires effective laws and regulation, and needs to shift from a reliance on occasional crackdowns to ongoing oversight. There is also a need for alignment of regulation and enforcement across different jurisdictions, so that regional loopholes do not allow illegal behaviour to creep in. ☞

Zhou Wei is senior oceans campaigner with Greenpeace and worked on the organisation's report into the catching of juvenile and trash fish.

“我们有责任讲述事实”： 《塑胶海洋》制作人专访

在BBC和美轮美奂的自然影像打了12年交道后，
乔·鲁克斯顿决定直面现实，揭露塑料垃圾带来的海洋灾难。

□ 奥利维亚·博伊德

电影人乔·鲁克斯顿是纪录片《塑胶海洋》的制作人，这部去年上映的纪录片突出展示了全球塑料污染对海洋环境的毁灭性影响以及给人类健康造成的威胁。

鲁克斯顿曾就职于世界自然基金会和英国广播公司，后参与成立了塑料海洋组织。这家非盈利组织的工作是提高公众意识，使其认识到依赖塑料的危害，以及遏制此种危害的紧迫性。

中外对话(以下简称“中”)：为什么我们中大多数人才刚刚意识到这个问题？

乔·鲁克斯顿(以下简称“鲁”)：我想这是因为我们一直觉得塑料是一次性的，而且理所应当认为它的存在也是暂时的。并且，塑料在我们的生活中也太常见了。人们已经逐渐接受塑料无处不在的事实，譬如在沙滩上看到塑料，你也不会觉得诧异。还有一个原因就是有关塑料上附着和析出的化学物质的科学研究都还很新。

对我而言，最震撼的一幕出现在太平洋中央。一个我以为是巨大的垃圾岛的地方，等靠近了，我才意识到它不是岛屿——而是很多细小的塑料颗粒和浮游生物的混合体，它的潜在危害更大。第二年我又去了大西洋，那里的情况也一模一样。

中：为什么说这个问题不仅关系到沿海居民，还关系到全球各地的人？

鲁：这和住不住在沿海没关系，你所呼吸的空气有一半来自海洋。海洋一旦生病，任何呼吸氧气的生物都会有麻烦。目前全球生产塑料超过3亿吨，其中一半都是一次性的，估计每年进入海洋的塑料有800万吨，相当于1961年全球塑料总产量。50年后情况又会是怎样？如果我们让3亿吨塑料都进入海洋，会不会影响海洋吸收二氧化碳、或者制造氧气的能力？要知道，除了推动天气变化，为我们提供食物、休



© Troy Mayne/Greenpeace

每年有大约800万吨塑料垃圾进入海洋，威胁着海洋生物和人类的健康

闲方式、交通和其他一切，海洋同样维系着气候的稳定。

然后就是人类健康的问题，刚开始制作这部影片的时候，我甚至没往这方面考虑。这些化学物质会进入食物链，不孕不育、癌症、自身免疫系统问题、内分泌紊乱、发育中儿童的行为问题、以及胎儿发育问题都与其有关。就算是特朗普这样的人也肯定会关心这个问题。

中：你的影片以一个不同的视角看待海洋，和我们平常在电视上看到的很不一样——是其他媒体在这个问题上有所误解吗？

鲁：自然纪录片通常将海洋描

绘成一个充满生机和原始活力的地方，但我想从一个完全不同的视角切入。

这是我离开英国广播公司的原因之一。我在自然历史组工作了12年，我们总是把一切都描绘得很美好，这让我非常沮丧。我曾经参与制作过不少有关鲨鱼的纪录片，并且一直想要加入一些有关大批鲨鱼遭猎杀的内容，但事实却是，大家想看的是娱乐性的东西，不想听到坏消息。

我觉得我们有责任讲述事实。越是粉饰太平，人们就会越觉得天下太平，然后继续自己的行为方式。

中：比如不做回收？为什么回收率这么低？

鲁：我觉得是因为我们懒，害怕麻烦。不得不说，在我住的地方有路边回收之前，我得把塑料单独攒起来，开车送到垃圾场，但如果遇到上班来不及或者清洁工人就在门外的情况，只要能把垃圾从厨房清理出去，怎么快，我就怎么干。我现在当然不会这么想，因为我的所学和所见让我不能这么做，但大多数人不会考虑这个问题。

中：塑料生产者该承担多大责任？例如，影片中就讲到了中国石化巨头中石化在香港沿海发生的一起重大的塑料颗粒泄漏事件。

鲁：我觉得他们有很大的责任，但我并不把他们视为敌人。因为我

们大家都用塑料，看看我的书桌，有一个装名片的塑料盒子，鼠标、手机、表面是塑料的椅子，指责塑料颗粒生产者是不公平的。

我们得让大家意识到，一次性使用带来的所谓便利是错的。一旦你的脑海中树立了塑料并非一次性物品的理念，你就有很多地方可以做出改变。如用固体肥皂，不要买塑料瓶装的液体肥皂。买纸质包装的黄油——不用每次都换新的黄油碟。如果不喜欢自来水的味道，就装个过滤器。重新用回钢笔。还有，看在老天的份上，别用吸管了。

中：那我们已经制造的麻烦呢？清理海洋的想法行得通么？

鲁：我不知道如何在不清除浮游生物的情况下清理(海面)。还有，超过一半的塑料都沉到海底去了，我们对那里的情况了解不够，现在还没法

清理。从海底上涌的生物太多了，海底生态系统支持着整个海洋。灯笼鱼是海洋中生物量最大的鱼类，约占海洋鱼类总量的 60% 左右，它们每天晚上都从海底迁至海面，把海底的东西带上来，然后进食海面的浮游生物以及塑料垃圾等，把它们带往海底。也就是说，海面和海底的物质是在不停交换的。清理海面塑料垃圾难道不会影响这些生物？

沙滩清洁机是有用的——如果清扫起来的塑料得到妥善归类和处理的话。我们在香港曾经有过一个，但有一次，台风赶在清运垃圾的日子之前来袭，负责运垃圾的委员会又不愿额外派人，于是那些塑料就全刮回海里去了。

中：海里的很多塑料最终都被动物吃了——影片中提到说 90% 的海鸟都曾吃过塑料，这个数据让人印象深刻。我们要怎么保护它们？

鲁：不仅是海洋生物。我在迪拜认识了一位兽医，他给我看了穿越沙漠的骆驼的图片，它们真的什么都吃，40% 的骆驼肚子里都有巨型的球根状物体，他给我看了一只骆驼的尸体剖检，那是一个塑料团成的大球，大概有 1 米宽。

我们得停止对它们的威胁，停止对我们自己的威胁。在我看来，意识带来的改变最大。因为你知道了这一切，就不可能继续假装不知道。改变太重要了，而一旦下定决心去改变，它就一点也不难。☺

奥利维亚·博伊德，中外对话前副总编。请关注她的推特 @oliviaboyd

Plastics is killing our ocean

Filmmaker Jo Ruxton talks about why she left the BBC to tell a more honest story about our seas

□ Olivia Boyd

Filmmaker Jo Ruxton is the producer of *A Plastic Ocean*, a documentary released last year to highlight the devastating impact of global plastic pollution on marine environments and the threat it poses to human health.

Ruxton worked for WWF and the BBC before co-founding the non-profit group Plastic Oceans, which works to raise awareness of the harm done by our addiction to plastic – and the urgent importance of curbing it.

chinadialogue (CD): Why are so many of us only just waking up to this problem?

Jo Ruxton (JR): I think because we've grown up assuming plastic was disposable, and we've never questioned the fact it is indestructible. It's just been part



of our lives. And because it's been a gradual process you start to accept it – you go to beaches, you expect to find plastic on them. The other thing is the science about the chemicals that attach to plastic and leach from it is all quite new.

For me, going to the centre of the Pacific was the biggest eye opener. I thought there was this giant island of trash but when I got there realised it wasn't a giant island – it was these tiny pieces that are all mixed in with plankton. That's far more insidious. The following year

I went to the centre of the Atlantic and of course it's exactly the same there.

CD: Why should this matter to people everywhere, not just those who live near the sea?

JR: It doesn't matter if you're in midwest America, every second breath you take has been provided by the ocean. If the oceans get sick, then anything that breathes oxygen is in trouble.

Global plastic production now is more than 300 million tonnes, half of which is for single use. The estimate that goes into the oceans every year is eight million tonnes, which is the equivalent to global plastic production in 1961. Can you imagine 50 years down the line if we're letting 300 million tonnes go in? Is it going to affect the absorption of carbon dioxide, or the ability to produce oxygen? Because that's what the oceans do for us. Apart from driving our weather systems, providing us with food, leisure, transport and everything else.

Then there's the human health side, which I hadn't even imagined when I first started making the film. These chemicals, which get into the food chain have been linked to infertility, to cancer, to autoimmune problems, to endocrine disruption, to behavioural problems in the growing child, to foetal development problems. Surely, even people like Trump are going to care about that.

CD: Your film shows a very different view of the oceans than we normally see on TV – are other media getting it wrong?

JR: Nature documentaries often portray the oceans as if they're full of life and pristine and I think give a very skewed view.

It's one of the reasons I left the BBC. I worked in the natural history unit for 12 years. And I found it quite frustrating because we were always showing everything as if it was fine. I worked on quite a few shark documentaries and always wanted to get something in about the

decimation of shark populations. But it always came down to the fact that people want to be entertained, they don't want bad news.

I think we have an obligation to tell it how it is. The more we show everything to be fine, the more people are going to assume it is and carry on behaving the way they do.

CD: Like failing to recycle? Why are recycling rates so low?

JR: I think because we're lazy; because it's inconvenient. And I have to say, before we had curbside recycling where I live I would put my plastic together to drive to the dump, but if I was late for work and the bin men were outside and I could just as quickly shove that out and get it out of my kitchen, I would do it. I wouldn't dream of it now. But I wouldn't dream of it now because I know what I know and I've seen what I've seen. Most people don't think about it.

CD: How much responsibility do the plastics producers have? Chinese oil giant Sinopec features in the film, for example, following a major spill of its plastic pellets off the coast of Hong Kong.

JR: I think they can play a huge role. But I don't see them as the enemy. Because all of us use plastic. I'm looking around my desk now. I have a plastic container for my business cards, I've got my mouse, my phone, plastic covering on my chair. It wouldn't be fair to point fingers at the people who are producing the pellets.

What we've got to do is make people realise that this so-called convenience of single use is what's wrong. Once you get into your head that plastic's not disposable, there are so many changes you can make. Use solid soap instead of

“

‘ Why are recycling rates so low? I think because we're lazy; because it's inconvenient ’
– Jo Ruxton, film director

”

buying a liquid plastic bottle. Use butter that's wrapped in paper – you don't need a new butter dish every time. If you don't like the taste of your tap water, then filter it. Go back to fountain pens. Stop using straws, for heaven's sake.

CD: What about the mess we've already made? Do the ideas for cleaning up the ocean have any merit?

JR: I don't know how you clean up [the surface] without removing the life-giving plankton. Also, more than half of the plastic sinks and we don't know enough about the bottom of the ocean to start hoovering it up. So much life upwells from the bottom of the ocean that supports the rest of it. Lantern fish have the biggest biomass in the ocean; they're about 60% of the ocean. Every night they migrate from the sea bed up to the surface, so they're bringing stuff up from the bottom and they're feeding at the surface and taking it down. What else might we take?

Beach clean-ups help – if the plastic is sorted and disposed of properly. We had one in Hong Kong and the council wouldn't come and collect it because it wasn't their collecting day and then there was a typhoon and it was all straight back in the sea.

CD: And a lot of washed out plastic ends up getting eaten by animals – the fact 90% of seabirds have eaten plastic stood out as a statistic from your film. How do we protect them?

JR: It's not just animals in the ocean. I was in Dubai and I met a vet who showed me pictures of camels that roam across the desert, eating whatever they can, and he reckons about 40% of them are getting massive bulbouses in their stomachs. He showed me a necropsy of one and it was compacted plastic in a big ball that was about a metre wide.

We've got to stop threatening them. We've got to stop threatening ourselves. To me, awareness is our biggest changemaker. Because you can't know about this and continue behaving as if you don't know about it. It's too important and it's too easy to change. ☺

Olivia Boyd is a journalist and editor based in London.

塑料鱼： 用艺术向海洋塑料污染开战

一场生态艺术展览向观众揭示了塑料污染对海洋的巨大危害。

□ 伊莎贝尔·希尔顿 夏·洛婷



由海上回收上来的塑料瓶和玻璃纤维棒制成的鱼类挂饰

当奥地利化学家沃尔夫冈·特勒纳克搬到西班牙西北部的时候，他被自家附近海滩上的大量废弃塑料

和海洋垃圾吓坏了。这些塑料瓶子、袋子、渔网、浮标、绳子、旧靴子、甚至玩具散落在数英里长的海岸线

上，让他意识到使用塑料对环境的严峻后果。

为了应对这一问题，他与同为化学家的玛格丽塔·西米德维拉成立了一个团体——ArSciencia，通过艺术与科学相结合的方式制造出具有创造性和创新性的作品，向公众进行宣传，并激发公众，尤其是年轻人采取行动应对污染、过度捕捞和海洋开发。

他们题为“海·塑”的展览在斑斓的色彩中透着肃穆。所有的艺术品都以海洋为主题，所用的材料都是被冲上大西洋加利西亚海滩的各种人类废弃物。

塑料瓶、袋子、渔网、绳子、

鞋子和玩具都被赋予了新的使命，以拼贴画和悬挂饰物等艺术形式呈现出来。五光十色的展品只有一个主题：海洋环境和海洋生物正遭受着废弃物引起的塑料摄入、缠绕和毒性升高等问题的残酷折磨，而这本是可以避免的。

这一展览属于“生态艺术”实验新浪潮的一部分，旨在唤起人们对环境、可持续性和循环利用等问题的关注。

他们的展览于欧盟委员会今年10月在马耳他举办的“我们的海洋”国际会议期间开幕。在开幕式上，我们抓住机会采访了几位艺术家。

这些塑料来自何方？

一大部分塑料来自渔业活动：渔网、鱼笼、绳索等一切渔民们会用到的东西，甚至还包括鞋子。另外一大部分来自水产养殖，这是加利西亚的一项重要产业，主要养殖对象是贻贝和牡蛎。第三个重要来源是生活垃圾和城市垃圾，凡是你能在超市买到的东西在海滩上都能找到。

调查塑料污染是一回事，用塑料制作艺术品又是另一回事，你们是如何想到这种方式的？

科学和艺术非常相似，其步骤都是一样的：调查、揣摩、试验。总

之它们有很多共同点。我们意在通过这些艺术品对抗塑料污染问题，所以我们在作品旁边都放了卡片，解释该作品所揭示的塑料污染问题，并提出对策。

调查发现是否让你感到震惊？

通过调查，我获悉鱼类会误食塑料，并死于无处不在的渔网缠绕。塑料材料的毒性改变了鱼类性别，并导致其他奇怪的现象。这真的令人震惊，因为在我们开始这项工作时，可以获得的科学信息微乎其微。

你希望艺术可以实现哪些与科学不同的结果？

我们认为艺术是向人们，特别是年轻人传递信息的媒介。我们并没有像通常那样使用刺激震撼的图片，而是用了一种可以说是更富诗意的的方式。但其背后的主题是非常严肃的。

你说有很多垃圾都来自渔业和水产养殖的生产活动。对此人们能做些什么？

渔民和水产养殖业者应该更加注意他们所用的材料。不仅要更换材料，还要更注意使用方法。一些材料是无意丢失，而非有意抛弃在海里的。

可以具体谈谈这一点吗？

一些材料可能是水产养殖场遭受风暴侵袭时丢失的，所以并非故意为之。人们应该注意不要在海滩上乱扔垃圾。每到夏天，我都看到很多人把垃圾留在海滩上。并非大家卫生习惯不好，但每个人都留下一点垃圾的话，也会越积越多。一些垃圾是被吹到海里的。加利西亚是一个多风的地方，所以即便你扔到垃圾箱里也可能被风吹走，最后落进大海里。

一些国家已经禁止使用塑料袋，你认为这是一个有效的办法吗？

是的，这是一个开始。西班牙已经在针对每个塑料袋的使用收取几分钱的费用，以此逐步禁止使用塑料袋。我可以看到人们正逐渐减少塑料袋的使用，但总的用量仍然很大。塑料瓶也是一样的。因为自来水有时并不卫生，而且带有氯味，所以很多人购买瓶装水，这个数量非常大。为了反映这一问题，我们用塑料瓶做了一个鱼类挂饰。

传递的信息很清楚：是时候采取行动了，我们真的面临一个巨大的问题。☺

伊莎贝尔·希尔顿，中外对话首席执行官及总编
夏·洛婷，伦敦记者，主要关注中国及环境问题

Plastic art

Science and art meet to tell a powerful story of how plastic pollution is harming the ocean

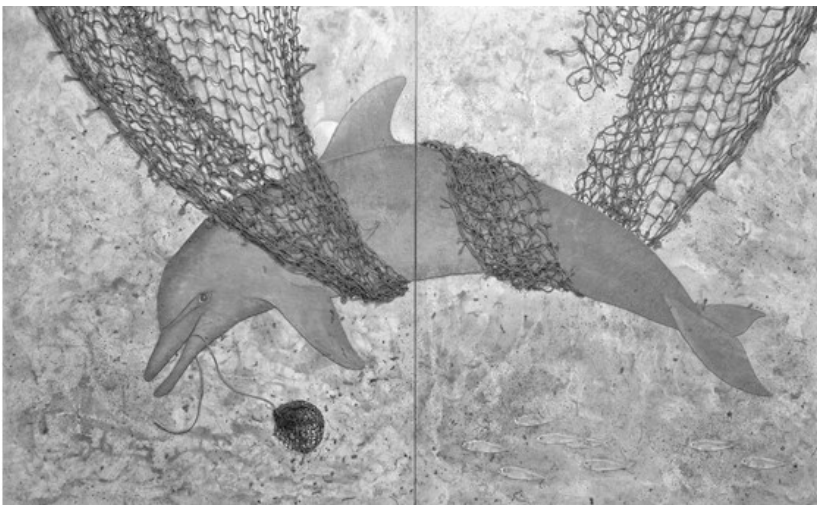
□ Isabel Hilton Charlotte Middlehurst

When Austrian chemist Wolfgang Trettnak moved to north-west Spain he was horrified by the volume of plastic and marine debris that collected on the beach near his home. The plastic bottles, bags, fishing nets, buoys, ropes, old boots and even toys strewn along the coastline for miles alerted him to the urgent environmental consequences of our plastic usage.

In response, he and Spanish fellow chemist Margarita Cimadevila founded an association, ArSciencia, dedicated to bringing art and science together to produce creative, innovative works that inform and inspire public action around pollution, overfishing and exploitation of the oceans, especially among young people.

Their exhibition, Mare Plasticum, is a colourful yet sobering collection of marine inspired art works that have been created exclusively from the human detritus washed up on the beaches of Galicia on the Atlantic Ocean.

Plastic bottles, bags, fishing nets, ropes, shoes and toys have been repurposed into art forms such as collages and mobiles. The diverse formats tell a singular message: that the marine environment and ecology is suffering cruelly from the avoidable ingestion of plastics, entanglement and raised toxicity resulting from Europe's waste problem.



Each year, thousands of dolphins die after accidentally getting caught in tuna nets.

The show belongs to a new wave of experimental “eco-art” that engages people on environment, sustainability and recycling issues.

We caught up with Wolfgang and Margarita at the opening of their show last month at the European Commission’s Our Oceans Conference in Malta.

Where does all this plastic come from?

A big part of the plastics come from fishing activities: nets, trap-boxes, lines ropes – anything used by fishermen, even shoes. Another big part comes from aquaculture, which is an important industry for Galicia, which farms mussels and oysters. The third source is domestic and urban litter. Anything you can buy in the supermarket you will find on the beach.

It is one thing to investigate plastic but to then make art out of it, how did that come about?

Science and art are very similar, they have the same steps: investigation, mediation, experimentation. Our intention is to fight plastic contamination so we put cards next to the works to explain the problem being highlighted and how to fight it.

Were you shocked by what you discovered?

I learned that fish are eating plastic and fish are dying because they end up in fishing nets, which travel all around the world. The toxicity of plastic materials is changing the sex of fish and causing other strange effects. It’s shocking because there was little scientific information available when we started.

What do you hope to achieve through art as opposed to science?

We think art is a medium to give a message to people, especially young people. We are not using shocking

images, as usually appear, but a more poetic approach, let’s say. But with a serious theme behind it.

You say a lot of this litter comes from work activity from fishing and aquaculture. What can people do about that?

Fishermen and people working in aquaculture should pay much more attention to the materials they use by using different materials and paying more attention to how they use them. Some of the materials are lost, rather than simply abandoned at sea.

So not losing them?

Some material might come from storms that have hit aquaculture farms, so this is not intentional. People should take care not to leave litter on the beach. In the summer, I see a lot of people leave litter. People are not dirty, but a lot of people leave a little litter so it accumulates. Some litter is blown in. Galicia is a windy place so even if you put it in the litter bin the wind may take it and later you’ll find it in the water.

Some countries have banned plastic bags, do you think that’s a helpful solution?

Yes, it’s a start. In Spain they have started banning them slowly, asking for a few cents for each bag. I can see usage is decreasing, but overall the amount of plastic bag use is still enormous. It’s the same problem with drinking bottles. Tap water is not always good and smells of chlorine so the amount of people buying bottled water is enormous. That is the reason why we made a fish mobile from plastic bottles.

The message is very clear: It’s time to act; we really have a problem. ☹

Isabel Hilton is CEO and Editor of chinadialogue

Charlotte Middlehurst is the Deputy Editor of chinadialogue.



PLASTIC ART

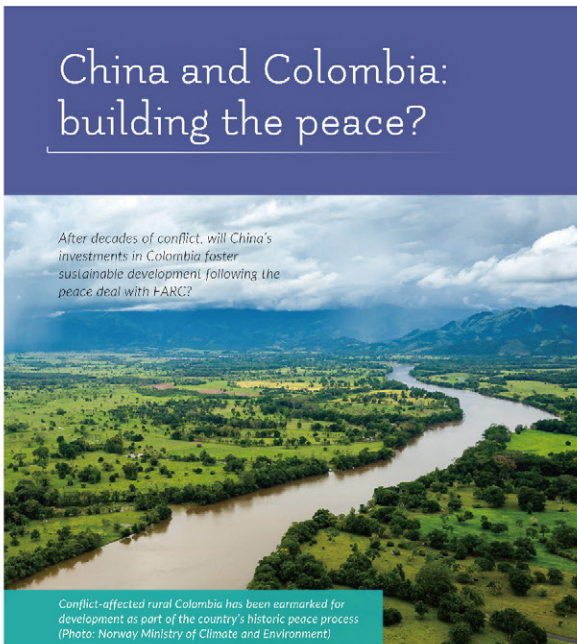


后和平协议时代的中哥关系

China and Colombia: building the peace ?

哥伦比亚数十年的内乱终于平息，中国投资能否帮助其走上可持续发展的道路？请看我们最新的报告。

After decades of conflict, will China's investments foster sustainable development following the peace deal with the FARC?



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Luis Gilberto Murillo, Colombia's environment and sustainable development minister speaking at the 2017 International Congress for Conservation Biology in Cartagena, Colombia (Image: Federico Ortiz)

Chinese investment can help conserve the environment in peace process Colombia

Colombians want Chinese investors eyeing opportunities to apply domestic environmental standards

"We need to make peace with nature," Luis Murillo, Colombia's environment and sustainable development minister, told a group of international policy leaders and academics at the International Congress for Conservation Biology (ICCB 2017) in the coastal city of Cartagena, the 28th such meeting of the scientific forum.

Colombia is in a nation's land and/or marine peace accord to its greatest group: the Association of Rural Peoples of Colombia (A.S.P.) "Newcomer"



Newly formed FARC fighters have been granted an amnesty, but energy access in rural communities is limited (Photo: CaudeMuellet)

Clean tech can help Colombia build a strong and lasting peace

China's renewable investment can improve energy access in conflict-affected rural areas

Colombia is in a swelling era of clean tech. Its new climate and development coalition will have a decisive influence on the agenda of the world's most... the ability to bring with it opportunities, and China can be a key partner in a new wave of clean tech and sustainable development for the country.

Colombia's historic peace process with the guerrilla group the Revolutionary Armed Forces of Colombia (FARC) made some important moves towards its goal, including the launch of a new newspaper, the Revolutionary



Workers at the Chinese-financed Casacunda hydroelectric plant in Ecuador (Photo: Agencia en Noticias Andes)

China needs urgent oversight of investments' overseas footprint

Lawyer Zhang Jingling says China needs legal requirements for overseas investment, not guidelines.

With the advent of the One Belt, One Road (OBOR) initiative, China's overseas investment footprint has grown. In 2017, China's overseas investment reached \$155.1 billion, up from \$148.5 billion in 2016. China's investments rank 16th globally behind the US and Spain.

Accompanying this, and due to weak environmental and social awareness, there have been frequent failures in how Chinese companies

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