



# 中外对话

## chinadialogue



### 气候变化， 中国的多重面向

China's multi-faceted  
climate record

解振华：我们不会改主意，也不重新谈判  
'We will not backtrack or renegotiate'  
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中国公众是否真的关注气候变化  
Does the Chinese public care about climate change?

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伊莎贝尔·希尔顿  
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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

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

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

## 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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# 解振华： “我们不会改主意，也不重新谈判”

解振华在对特朗普政府进行含蓄批评的同时，再次申明了中国的气候承诺。

□ 李 婧



解振华重申中国的气候承诺

9月9日，国际气候会谈在曼谷落下帷幕，未能就《巴黎协定》的实施细则取得实质性进展。一周后，中国气候变化首席代表解振华重申了各国在2018年12月最后期限之前敲定细则的承诺。

中国气候变化事务特别代表解振华上周在旧金山举行的全球气候行动峰会上告诉记者，各国已经达成共识，对2015年巴黎会谈上达成的气候目标“不会改主意，不会重新谈判”。

“大多数国家——除了极少数——都表现出了灵活性和强烈的政治意愿。”解振华说，“我们一致同意，我们只能从《巴黎协定》出发向前走，不会倒退，不会重新考虑已经达成共识的问题，”他补充道。

9月4至9日，联合国气候会谈在泰国曼谷举行，与会的发展中国家和发达国家就各国设定国家温室气体减排目标的雄心持不同意见。

中国和其他发展中国家一起，要求谈判文本允许一些国家作出自愿而非强制性的承诺。这遭到了以美国为首、包括加拿大和澳大利亚在内的“伞形集团”的反对。

解振华没有指名道姓，只表示曼谷气候会谈期间，某些国家不顾全球去碳化这一“不可逆转的趋势”，立场“令人失望”。

解振华暗指的可能是特朗普政府，特朗普政府计划美国在2020年正式退出《气候协定》，并一直试图为国内日渐消沉的煤炭行业提供补贴，以及下调车辆排放标准。

尽管陷入僵局，解振华确信合作终将取得胜利。各国已经缩小分歧，并将谈判文件的篇幅缩减至约250页，以简化这一过程。

## 揭开旧伤疤

布鲁金斯学会资深研究员、2016年以前一直担任奥巴马政府气候特使的托德·斯特恩说，特朗普政府在全球气候谈判中缺乏政治参与，“让事情变得非常困难”。

斯特恩说，奥巴马政府曾经展现出的协调全球最大的两个碳污染国家之间分歧的善意如今消失殆尽。

“我所说的我们曾经合作良好，并不意味着这个过程中没有冲突和争辩，也不意味着意见完全一致……我们知道大家都试图以一种不会越过红线的方式共同努力。”斯特恩说。

“最终——也许会花上很长时间——我们会找到办法的。”他还说。

能源基金会北京办事处总裁邹骥也认为，特朗普政府对气候谈判不合作的态度，让美国成为国际谈判的“负担”。

“美国不合作，还提一大堆要求。”他说。

斯特恩说，他如果参加曼谷谈判，也会反对发展中国家和发达国家采取不同规则的议案。

“这恰恰越过了红线，”他说，“这么做就是重新协商巴黎峰会已经确定的问题。”

2018年12月，《联合国气候变化框架公约》第二十四次缔约方会议将在波兰卡托维兹举行。斯特恩说，在这一最后期限之前，各国还有足够时间来克服这一症结。

解振华认为，谈判进行到现阶段，各国提出“高要求”是正常的。他还说，谈判不是一场零和博弈，每个国家最终必须做出妥协。

“我们的目标是保护人类共同的未来。”他说，“然后守住各（成员）国的利益和红线。”

李婧，自由撰稿人，关注环境与气候议题

# ‘We will not backtrack or renegotiate’, says China’s top climate negotiator

Special representative Xie Zhenhua affirms climate commitment while making a veiled criticism of the Trump administration

□ Li Jing

A week after international climate talks in Bangkok failed to deliver substantive progress on guidelines for implementing the Paris Agreement, China’s top climate envoy has reaffirmed the commitment of countries to finalise rules by the deadline in December 2018.

Xie Zhenhua, China’s special representative of climate change affairs, told reporters at the Global Climate Action Summit in San Francisco last week that member countries have reached a consensus “not to backtrack or renegotiate” on environmental targets agreed in Paris in 2015.

“Most of the countries – except for a few – have demonstrated flexibility and strong political will,” said Xie. “We have agreed that we can only move forward from the Paris Agreement, and will not backtrack on what has already been agreed,” he added.

“Xie said the stance of certain countries had been “disappointing” during the negotiations.”

The comments followed a United Nations climate meeting in Thailand from 4-9 September where developing and developed countries clashed over the level of ambition required by each country when setting national targets to cut greenhouse emissions.

China sided with other developing nations in calling for the negotiation text to allow voluntary rather than mandatory commitments for some countries. This was rejected by the “Umbrella Group” of countries led by the US, including Canada and Australia.

Avoiding names, Xie also said the stance of certain countries had been “disappointing” during the negotiations in Bangkok because they had disregarded “the irreversible trend” of global decarbonisation.

Xie was likely making a veiled criticism of the Trump administration, which plans to formally withdraw the United States from the Paris Agreement in 2020, and has been looking for ways to subsidise a declining domestic coal sector and rollback vehicle emission standards.

Despite the impasse, Xie affirmed that cooperation would



ultimately triumph. Countries have already narrowed down their differences, and simplified the process by reducing the size of the negotiation text down to approximately 250 pages.

### Opening up old wounds

Todd Stern, a senior fellow with the Brookings Institution and a former special climate envoy under president Barack Obama until 2016, said the lack of political engagement by the Trump administration in global climate negotiations is “making things very difficult”.

Stern said the goodwill that helped the world’s two largest carbon polluters navigate their differences during the Obama administration is missing.

“When I say we had very good cooperation that didn’t mean we didn’t fight and argue and have very different views...we knew we were committed to trying to work together in a way that wasn’t going to cross red lines,” said Stern.

“Eventually – although it could take a long time – we will find a way,” he added.

Zou Ji, president of Energy Foundation’s China Programme, agreed that the Trump administration’s

uncooperative approach to climate negotiations has made the country “a burden” to international talks.

“It is not cooperating, yet it is still making a lot of requests,” he said.

Stern said if he had been at the negotiation table in Bangkok, he too would have opposed the motion for different rules between developing and developed countries.

“This precisely runs across red lines,” he said, “it would be renegotiating what has been agreed in Paris”.

He said there was still enough time to overcome this sticking point, among others, before the deadline for formulating guidelines in December 2018 at the 24th Conference of the Parties in Katowice, Poland.

Xie said it is normal for countries to set “high demands” at this stage in negotiations, adding that the talks are not a zero-sum game, and that every country will have to make compromises eventually.

“The aim is to safeguard the shared future of humanity,” he said, “and then to safeguard [the] interests and red lines of each of [the member] countries”. ☞

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

# 中国给煤电建设松绑？

中国煤电去产能进程似乎正在扭转方向，  
一些曾被叫停的煤电厂复工建设，专家呼吁保持政策定力。

□ 冯 灏

**关**注全球煤电建设的CoalSwarm于9月26日发布新报告。报告指出，中国正在开发建设的煤电装机达259GW，几乎相当于美国全部煤电装机。而这与中国此前限制新增煤电产能的政策背道而驰。

中外对话上月曾援引CoalSwarm的研究，指出此前被搁置和缓建的46GW煤电产能有复工迹象。这一发现来自CoalSwarm对卫星图片的分析。

最新的259GW估算包含了上述卫星图片分析发现的46GW复工产能，也包括此前已知的处于开工前期和在建的产能，以及59GW的目前被缓建令所冻结的产能。CoalSwarm认为这59GW的产能未来很有可能“会重启”。

华北电力大学教授袁家海确认，今年5月份国家能源局发布的2021年煤电规划建设预警中，确实根据这两年电力需求的实际变化，将陕西、湖北、浙江、江苏、安徽等省份的装机充裕度预警调整为绿色，

即部分缓建项目可以复工，但是否是全面复工重建，目前尚未明朗。他同时认为，“十三五”规划将中国煤电装机控制在1100GW范围左右的目标仍有可能达成。

但中国目前煤电装机已达993GW。CoalSwarm警告称，如果这些煤电产能建成，将使中国“严重背离”巴黎气候协定的2度温控目标。

工地变成了冒着白烟的煤电厂，圆形的地基上长出了高高的冷却塔……关注煤炭问题的民间智库CoalSwarm在卫星照片上发现，不少曾经被政府叫停的中国煤电厂工地已在过去一年里悄然复工。

按照CoalSwarm的计算，2018年上半年，在地球影像公司Planet Labs提供的卫星照片上能辨认出的中国新建和恢复建设的燃煤电厂装机规模总和达到了46700兆瓦（46.7GW）。这些正在和即将发电的电厂，将令中国煤电产能一下子增加约4%。

熟悉中国煤电行业的人都知道，从2016年后，这个行业最大的问题就是过剩。难道情况已经变了吗？

## 煤电需求反弹

按照中国官方近日公布的上半年经济数据以及近期政策的变动，中国近期的煤电需求的确在反弹。

国家能源局发展规划司司长李福龙7月30日在新闻发布会上就表示，上半年全国煤炭消费同比增长3.1%左右，发电用煤大幅增长是煤炭消费增长的主要拉动力量。统计局数字显示，上半年中国用电量相比去年同期猛增9.4%。

与此同时，进入夏季，不少地区出现了短期用电负荷短缺的现象，山东、河南、湖南、湖北、浙江等地均有电力供需形势严峻的报道，其中山东省预计将有3000兆瓦（3GW）的供电缺口。

鉴于电力供需关系的变化，政策层面，中国也的确对煤电行业进

行了一定程度的松绑。2018年5月，国家能源局允许此前被勒令停止煤电建设的陕西、湖北、江西、安徽恢复建设；还有四个省份的煤电建设也获得一定程度的解禁。

“工业用电需求的反弹似乎改变了政策制定者的态度，使他们对产能过剩更加宽容。”绿色和平能源分析师柳力(Lauri Myllyvirta)表示。

另外，华北电力大学教授袁家海认为，一些已经建设差不多的煤电项目迟迟不能并网、没有收益，还要还贷款，这给企业和地方政府造成很大的压力，因此电力企业和地方的游说也是政策放松的重要原因。

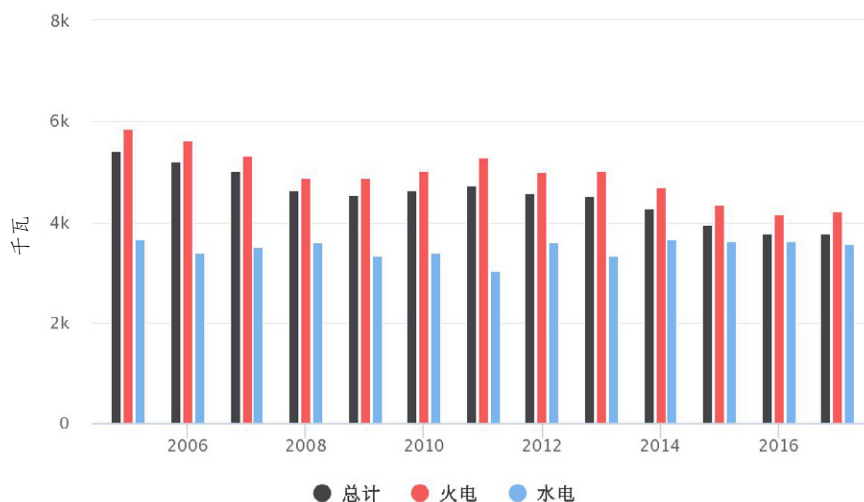
## 政策缺乏定力

柳力所说的政策制定者的态度指的是煤电行业过去两年的“主旋律”——去产能。

由于进入新世纪后基础设施建设等高耗能产业获得大发展，中国在2013年之前经历了一轮约12年的煤炭和电力消费快速增长期，这导致了全国各地煤电投资的急剧增长，最终造成煤电产能严重过剩，行业面临财务风险。

煤电的疯狂扩张也加剧了空气污染和部分地区的水资源紧张，从而令中央政府从经济和环境层面都不得不对煤电行业加以约束。

中国火电设备平均利用小时数变化趋势



2016年4月，中国的最高经济规划部门发改委和最高能源主管部门国家能源局联合下发文件，要求各省严控煤电总量规模，接近一半的省（区）被要求暂缓开工建设煤电项目。2017年，能源局又一次性叫停超过100座建设中的煤电厂。

## 产能过剩遇上需求猛增

那么，今年电力需求的激增是否将会彻底扭转中国已经实行了两年的煤电去产能政策呢？

需要注意的是，煤电去产能政策仅仅暂时遏制了煤电行业过剩形势的继续恶化。中国的火电设备利用小时数刚刚从2016年的近50年最低谷略微回升，还远远没有回到健康的水平（每年约5500小时），甚至还没有回升

到2015年的水平。换句话说，中国煤电依旧产能过剩。

另外，能源局官员李福龙也透露，由于煤价上涨，上半年中国煤电企业有一半都在亏损。整个煤电行业的营收情况的确比2017年要好，但还远不到乐观。

袁家海认为，为了几十小时的尖峰负荷增加煤电装机是最不经济的做法。如果能源政策制定者在思想上过于保守，会导致煤电供给侧改革政策的执行“定力不够”。

“我认为一旦工业反弹失去动力，政策将会重新关注产能过剩。”柳力表示，“但目前而言，对于煤电产能过剩风险的关注似乎被搁置了。”

冯翊，中外对话研究员

# China is building coal power again

Experts are calling for the government to return to cutting capacity after policy reversal

□ Feng Hao



© V.T. Polywoda

*Will this year's sudden leap in demand for power end China's two-year policy of reducing coal-power capacity?*

CoalSwarm published a report on September 26 warning that 259 gigawatts of coal power capacity – equivalent to the entire coal power fleet of the United States – is being built in China despite government policies restricting new builds.

This blog reported last month that China was building 46 gigawatts of coal power that had been shelved or suspended,

and which was discovered by CoalSwarm through an analysis of satellite imagery.

The new estimate by CoalSwarm takes the 46 gigawatts found by satellite imagery and adds other projects in the pre-construction/construction phase, as well as 57 gigawatts of shelved projects that seem likely to go online in the near future.



Professor Yuan Jiahai of North China Electric Power University told chinadialogue that China loosened its restrictions on new coal-fired power construction in five provinces earlier this year. He is confident that China can keep its total coal power capacity within the 1100-gigawatt ceiling announced in the 13th Five-Year Plan, which runs through to 2020.

However, China's coal power capacity already stands at 993 gigawatts, leading CoalSwarm to warn that the sector's resurgence is wildly out of line with the Paris Agreement, which commits countries to limiting the average global temperature rise from climate change by 2 degrees Celsius above the pre-industrial period.

### Facts on the ground

Satellite imagery reveals that many coal-fired power projects that were halted by the Chinese government have quietly restarted.

Analysis by CoalSwarm estimates that 46.7 gigawatts of new and restarted coal-fired power construction is visible based on satellite imagery supplied by Planet Labs. The coal-fired power plants are either generating power or will soon be operational. If all the plants reach completion they would increase China's coal-fired power capacity by 4%.

One of the biggest issues facing China's coal sector since 2016 has been too much generating capacity, not too little. So what changed?

### Demand for coal-power rebounds

Recently published economic data for the first half of 2018, along with the latest policy adjustments, indicate that China's power demand is rebounding.

Li Fulong, head of the department of development and planning at the National Energy Administration, said at a

press conference on July 30 that coal consumption in China increased about 3.1% in the first half of 2018 compared with the same period last year. The main driver of that was coal-fired power generation. Figures from the National Bureau of Statistics show a leap of 9.4% in electricity use across the same period.

Meanwhile, the arrival of summer has led to temporary electricity shortages in many regions, with reports of power demand outstripping supply in Shandong, Henan, Hunan, Hubei and Zhejiang provinces. In Shandong the shortfall was estimated at three gigawatts.

This has resulted in a loosening of policy-level restrictions on the coal power sector. In May 2018 the National Energy Administration permitted Shaanxi, Hubei, Jiangxi and Anhui to restart construction of coal-fired power stations. Restrictions were also relaxed to some degree in four other provinces.

"A rebound in industrial demand for electricity seems to have shifted attitudes among policy-makers, who are now more accepting of overcapacity," said Lauri Myllyvirta, energy analyst with Greenpeace.

Yuan Jiahai, a professor at North China Electric Power University, said that some plants are almost complete but not generating power or making money, while loans taken out still need repaying. This has led companies and local governments, which are under pressure to get projects operational, to lobby for a change in policy.

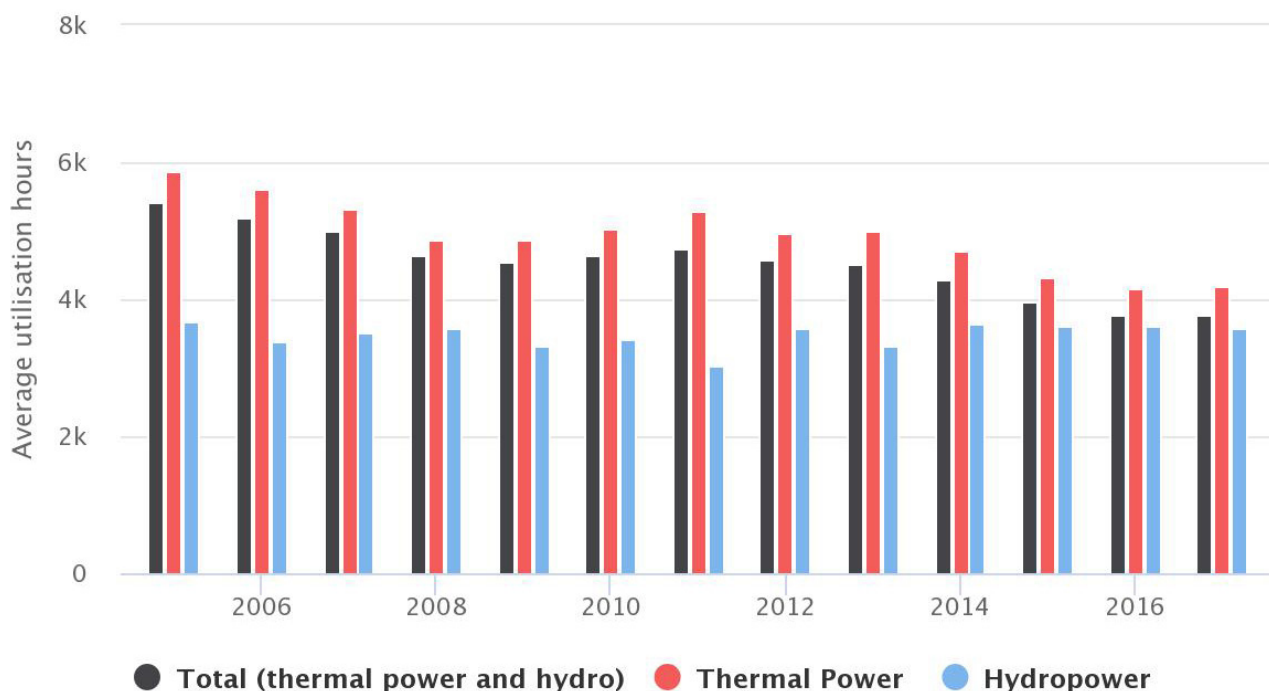
### A lack of policy focus

The focus of the past two years has been on cutting capacity in the coal sector prompted by concerns about its rapid expansion and contribution to air pollution.

Power-hungry sectors such as construction grew rapidly early in the century, and by 2013 China had experienced 12 years of breakneck growth in consumption of coal and

A rebound in industrial demand for electricity seems to have shifted attitudes among policy-makers, who are now more accepting of overcapacity.

### Changes in average hours of utilisation for thermal power generation in China from 2005 to H1 2018.



power. This led to overinvestment in coal power throughout the country and ultimately overcapacity and financial risk.

That blind expansion also worsened air pollution, and in some regions caused water shortages. The Chinese government was forced, for both economic and environmental reasons, to rein in the coal-power sector.

In April 2016 the National Development and Reform Commission and the National Energy Administration – the country’s top economic planning and energy regulation authorities respectively – issued a joint document instructing provinces to limit total coal-fired power capacity. Almost half of all China’s provinces were told to postpone the construction of new coal-fired power projects. In 2017 the State Energy Administration again halted work on over 100 plants that were under construction.

### Overcapacity meets rocketing demand

So will this year’s sudden leap in demand for electricity end China’s two-year policy of reducing coal-power capacity?

It’s worth noting that the policy of reducing capacity only temporarily reined in a trend towards overcapacity in the sector. Utilisation rates for coal-fired plants recovered slightly from a 50-year low in 2016, but are still nowhere near a healthy level of about 5,500 hours a year, and have not even returned to 2015 levels. In other words, there is still too much coal-fired power.

Li Fulong said that due to a hike in coal prices, half of the country’s coal power plants were running at a loss in the first six months of the year. The sector is in poor shape generally and is still trying to recover from a bad 2017.

Yuan Jiahai said that adding coal-fired power capacity just to meet some tens of hours of peak load would increase costs in the long run.

“I think once the industrial rebound runs out of steam, there will be a renewed focus on overcapacity, but for now the issue seems to be firmly on the back-burner,” Greenpeace’s Lauri Myllyvirta said. ☞

*Feng Hao is a researcher at chinadialogue.*

# 中国可以助力非洲能源绿色化

中国如何将其在非洲的能源投资与其气候南南合作的愿景进行调和？

□ 白莉莉

**在**过去的一年里，埃及签署了建造全球最大燃煤电站的合同，并着手修建世界上最大的太阳能电站——两者都得到了中国的银行和承建商的帮助。

这些大型项目突显出中国优先发展清洁能源项目的南南气候合作愿景与其对非实际投资之间的鸿沟。中国对非投资仍包括一些环境风险较高的煤电和水电项目。

亿美元、100 亿美元、200 亿美元的贷款，而 2015 年峰会上承诺的对非广义“投资”更是增长了3 倍，达 600 亿美元。

这些贷款中有一部分是能源项目。波士顿大学的数据显示，2000 至 2016 年间，中国两家主要的海外金融投资机构——中国进出口银行和国家开发银行为非洲提供的能源贷款主要集中在水电、石油和煤炭领域。

尽管仍在为化石燃料项目和水电提供资金（相比燃气和燃煤发电，水电的碳排放确实较低，但其温室气体排放高于风能和太阳能），但中国在往届论坛上已经传达出要降低自身投资决策的气候变化影响的信号。

2009 年的论坛上，时任中国总理温家宝提出了一项倡议，计划在非洲建设 100 个清洁能源项目。2015 年中

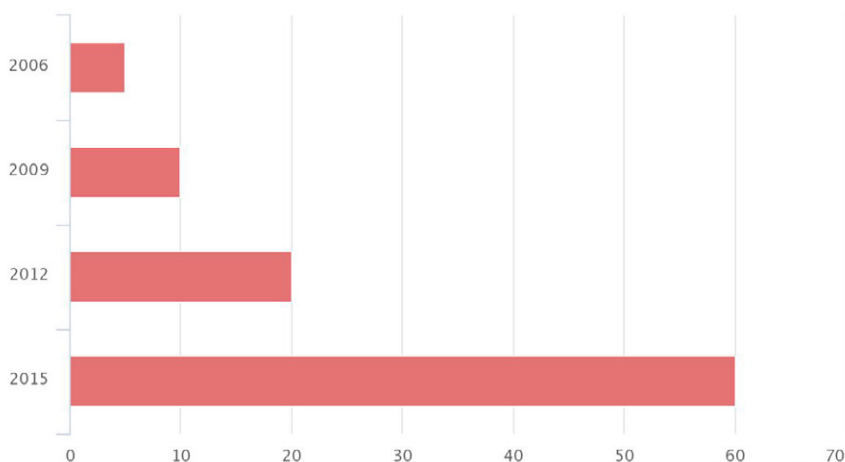
## 制定能源和气候路线图

9 月 3 至 4 日，53 个非洲国家的领导人齐聚北京，参加 3 年一度的中非合作论坛。该论坛起始于 2000 年，是深化中非双方政治和经济纽带的平台。鉴于中国已经成为非洲第三大投资来源国，这一论坛的作用愈发重要。

在往届的峰会上，中国领导人都曾承诺向非洲国家提供大笔贷款。2006 年、2009 年、2012 年的非洲论坛上，中国分别承诺为非洲国家提供 50

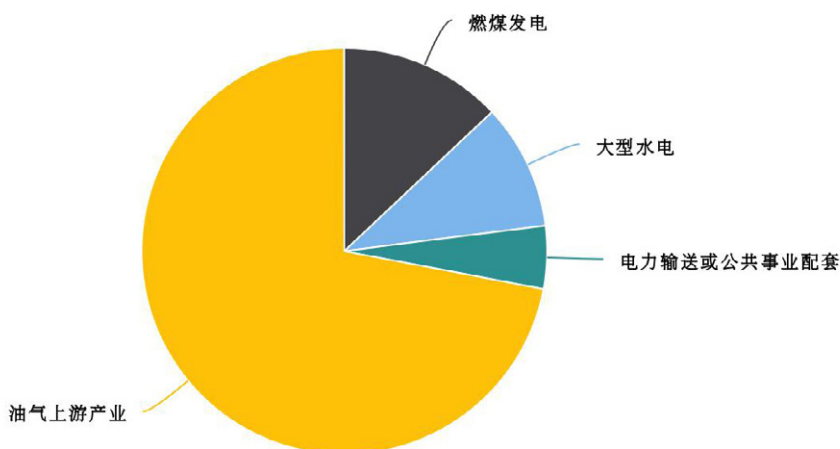
往届中非合作论坛上中方承诺的投资额

（单位：十亿美元）



## 2014至2016年中国对非洲能源项目公共融资

按类别区分



数据来源：石油变革国际组织的“补贴变化数据库”

非合作论坛行动计划提到了中国将为气候变化南南合作基金注资 31 亿美元，从而推动非洲气候行动。

然而，一些专家认为中国做得还不够。在中国非洲项目（The China Africa Project）最近一次的播客采访中，专家们预计绿色问题不会成为今年会议的主要议题。非洲民间社会的领导人们呼吁变革：南非约翰内斯堡非政府组织非洲地球生命（Earthlife Africa）主管玛科玛·勒卡拉卡拉说：“我们希望今年的中非合作论坛可以更加关注中国对非洲的清洁能源投资。”

## 化石能源融资

中国有能力塑造非洲能源开发的方向。根据石油变革国际组织的一份报告，2014 至 2016 年间，中国是非洲最大的能源开发公共融资国。其中，油气行业上游产业在其投资中占到了很大比重（72%），其次是煤电和大型水电项目。

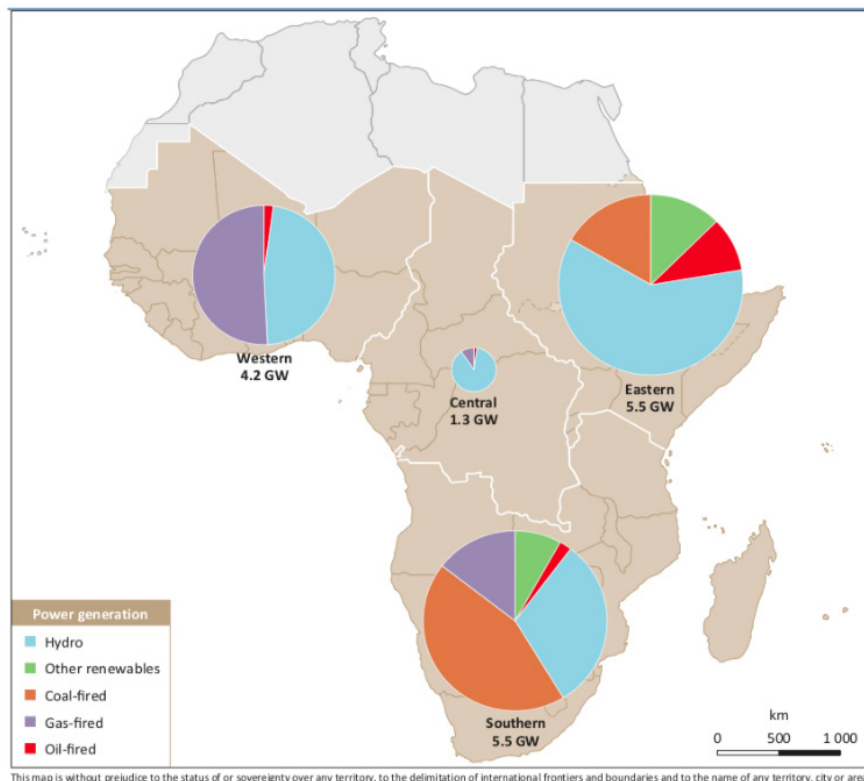
根据国际能源署（IEA）2016 年的一份报告，2006 至 2016 年间非洲建造的燃煤电站中约三分之一由中国承包商承建，并且大部分由中国提供资金。

追踪全球范围内煤炭项目的 Coalswarm 显示，中国参与资助或建设的非洲煤电项目总装机达 1570 万千瓦的，占非洲总发电量的 10%（2016 年非洲总发电量为 1.68 亿千瓦）。

这些煤电项目通常位于煤炭资源国。国际能源署的报告称，中国建设的煤电项目大约有四分之三位于拥有煤炭储备的南部非洲。

然而，肯尼亚、加纳、埃及等并非以煤炭为主要发电原料的国家

## 2010至2020年中国发电项目的地区分布情况



电力类型：水电（蓝色），其它可再生能源（绿色），燃煤（橙色），燃气（紫色），燃油发电（红色）

来源：国际能源机构



也提出了新的煤电项目。埃及曾于2015年颁布煤炭进口禁令，而即将由中国企业承建的660万千瓦哈马拉维因（Hamarawein）大型电站项目则标志着一种逆转。

## 清洁能源新进展

中国对非洲可再生能源部门（水电除外）的参与非常有限。根据国际能源署的数据，2006至2016年间，中国在撒哈拉以南非洲修建的发电设施中水电以外的可再生能源项目仅占7%，其中包括科摩罗、肯尼亚、刚果民主共和国和塞内加尔的太阳能项目，以及吉布提和肯尼亚的风能项目。

然而，新一轮的项目正蓄势待发。能源经济与金融分析研究所（Institute for Energy Economics and Financial Analysis）2018年的一份报告引述称，中国电力建设集团将在加纳的布维新建20万千瓦的太阳能电站；中国龙源电力集团正在南非开普敦附近修建的24.45万千瓦的

德阿（De Aar）风电厂；以及埃及的本班（Benban）太阳能公园。

中国的太阳能和风能企业同时也是这些项目的设备制造商和供应商。2014年，晶科能源在南非成立一家太阳能光伏工厂，协鑫集成随后宣布将效仿晶科，在埃及设立太阳能光伏工厂，从而扩大了企业进入非洲市场的机会。

## 转向绿色

2015年成立的气候变化南南合作基金确立了中国作为其他发展中国家清洁能源发展引路人的形象，基金的目标之一就是支持100个气候变化减缓和适应项目。

该基金起步缓慢，但北京大学研究员王彬彬认为，基金的步伐正在加快，中国4月份成立的首个援助机构将肩负起基金的责任，这也将有助其加快步伐。

引导气候援助和贷款转向可再生能源将对非洲的能源发展产生重大影响。例如，肯尼亚虽然希望充分

利用其丰富的可再生能源资源，成为清洁能源枢纽，但同时也计划在中国资金的帮助下建设其第一座燃煤电厂。鉴于其他国际贷款机构越来越不愿意支持此类项目，中国投资重心的转移可能会改变肯尼亚对煤炭产业发展的考量。

亚洲基础设施投资银行（中国主导的多边银行）虽因未能充分践行其“绿色、精干、廉洁”的理念而遭到诟病，但其投资的埃及本班太阳能发电场有助于推动可再生能源转型。

中国在非洲投建化石能源项目意味着我们需要的不仅仅是高层领导人作出的承诺和一些试点项目。从开普敦遭受的严重旱灾到马里的荒漠化，气候变化对非洲的影响有目共睹。中非合作论坛为各国领导提供了一个正视现实，调整能源发展方向，应对气候变化的机会。⑤

白莉莉，中外对话研究员，北京能源网络（Beijing Energy Network）执行制作

# Are China's energy investments in Africa green enough?

New coal power projects in developing countries go against China's vision for South-South climate cooperation

□ Lili Pike



*In the past year, Egypt signed contracts to build the world's largest coal-fired power plant and broke ground on the world's largest solar farm – both with the help of Chinese banks and contractors.*

In the past year, Egypt signed contracts to build the world's largest coal-fired power plant and broke ground on the world's largest solar farm – both with the help of Chinese banks and contractors.

These mega projects highlight a growing gap between

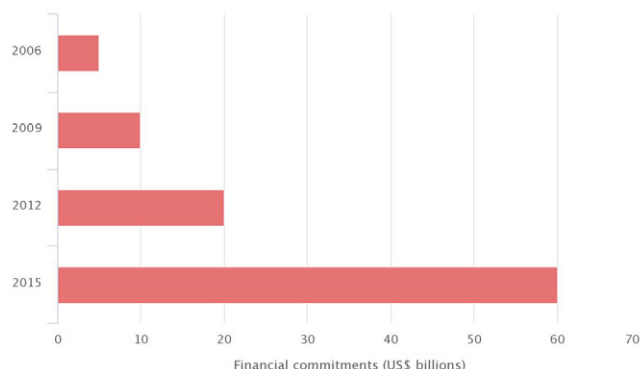
China's vision of South-South climate cooperation, which prioritises clean energy projects, and its actual investments across the African continent, which still include coal and hydropower projects that pose serious environmental risks.

## Setting the energy and climate roadmap

Leaders from 53 African nations are gathered in Beijing from September 3-4 for the triennial Forum on China Africa Cooperation (FOCAC). Established in 2000, FOCAC is an arena for China and Africa to deepen their political and economic ties, which are increasingly important given that China has become Africa's third largest investor.

At past summits, Chinese presidents committed major loans to African nations – US\$5 billion in 2006, US\$10 billion in 2009, US\$20 billion in 2012, tripling to US\$60 billion in more broadly defined “investment” in 2015.

**Financial commitments during previous FOCAC**



A portion of these loans has gone toward energy projects. Boston University data shows that energy lending to Africa by the Export-Import Bank of China, and China Development Bank, which are the main financiers of the country's overseas investment, went primarily to hydropower, oil, and coal from 2000-2016.

Although China is still funding fossil fuel projects and hydropower (the latter is low-carbon compared to natural gas or coal-fired power but it produces more greenhouse gases than wind and solar), it has signalled at previous FOCAC summits the need to mitigate climate change in its investment decisions.

At the 2009 FOCAC, Premier Wen Jiabao proposed an initiative to build 100 clean-energy projects in Africa. China's US\$3.1 billion South-South Climate Cooperation Fund was referenced in the 2015 FOCAC action plan as a way to bolster climate action in Africa.

Nonetheless, some experts think that China is not taking strong enough action. In a recent podcast interview by *The China Africa Project*, experts anticipated green issues would be side-lined at this year's conference. Civil society leaders in Africa have called for change: Makoma Lekalakala, director of the non-governmental organisation Earthlife Africa in Johannesburg, said “We hope that at this year's FOCAC there will be a greater focus on Chinese investment in clean energy in Africa.”

## Fossil finance

China is in a position to shape the direction of Africa's energy development. According to a report by Oil Change International, China was the largest provider of public finance for energy development in Africa from 2014 to 2016. Most of this went to upstream oil and gas (72%), followed by coal-fired power and large hydropower projects.

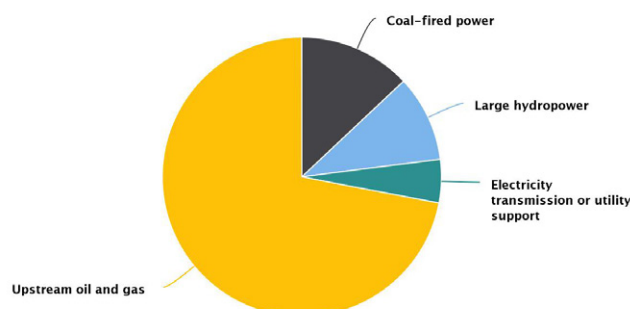
Around a third of African coal-fired power plants built in the decade up to 2016 were constructed by Chinese contractors, the majority with Chinese funding, according to a 2016 report by the International Energy Agency (IEA).

Coalswarm, a Wiki encyclopaedia that tracks coal projects globally, shows that China has been involved in the finance or construction of 15,700 megawatts of coal capacity in Africa – around 10% of the continent's total power capacity (168,000 megawatts in 2016).

These coal power projects have typically been located in countries with domestic coal resources: almost three-

**Chinese public finance in energy in Africa by type**

(2014-2016)



quarters of Chinese-built coal-fired capacity is in Southern Africa where coal reserves are available, the IEA report says.

However, new projects have been proposed in countries where coal is not a mainstay of power generation, including Kenya, Ghana, and Egypt. The latter's 6,600-megawatt Hamarawein mega project, which will be built by Chinese contractors, represents a further backslide toward coal following Egypt's reversal on a ban on imports for coal power in 2015.

### Nascent clean energy development

China's involvement in Africa's renewable energy sector (excluding hydropower) has been limited. According to IEA, from 2006-2016 only 7% of Chinese-built power generation in Sub-Saharan Africa were non-hydropower renewable plants. These include solar projects in Comoros, Kenya, DRC, and Senegal, and wind projects in Djibouti and Kenya.

However, a new wave of projects is on the horizon. A 2018 report from the Institute for Energy Economics and Financial Analysis (IEEFA) cited an additional 200-megawatt solar farm to be built by PowerChina in Bui, Ghana; and the 244.5 megawatt De Aar wind farm being built by China's Longyuan Power Group Corporation near Cape Town, South Africa; along with the Benban solar farm in Egypt.

Chinese solar and wind companies are also serving as equipment manufacturers and suppliers. In 2014, Jinko Solar built a solar PV factory in South Africa, and GCL just announced it is following suit in Egypt, increasing the companies' access to the African market.

### Shifting to green

The South-South Climate Cooperation Fund, launched in 2015, established a vision of China as an emissary of clean

energy in other developing countries. One of the fund's goals is to support 100 climate mitigation and adaptation projects.

The fund has had a slow start. However, Wang Binbin, a researcher at Peking University, argues it is gathering pace and will be helped by the creation in April of China's first aid agency, which will assume responsibility for the fund.

Directing both climate aid and loans toward renewable energy would have major implications for Africa's energy development. For instance, Kenya aims to be a clean energy hub by harnessing its rich renewable energy resources, but it is also planning to build its first coal-fired power plant with the help of Chinese financing. A change in China's investment priorities could alter Kenya's calculus about coal as other international lenders are increasingly unwilling to support such projects.

Egypt's Benban solar farm, which is part-financed by the Asian Infrastructure Investment Bank – China's flagship multilateral bank, could help drive a shift towards renewable projects, although the bank has been criticised for not sufficiently delivering on its motto to be “green, lean, and clean.”

The significant stock of fossil energy projects China has built in Africa means that it will take much more than a few high-level pledges and pilot projects. With climate change visibly impacting Africa from Cape Town's severe drought to desertification in Mali, FOCAC presents an opportunity for leaders to align energy development with the reality of climate change. ☺

*Lili Pike is a researcher for chinadialogue and the executive producer of the Beijing Energy Network's podcast, Environment China.*



# 太阳能地球工程会在中国破土吗？

中国正在研究太阳能地球工程技术拯救气候的潜力，  
同时也对其可能带来的巨大风险显示出高度谨慎。

□ 白莉莉

**2040** 年的地球很热——平均气温比工业革命前高 1.5 摄氏度。由于家园被不断上涨的潮水侵蚀，沿海城市的居民正向更高的地方撤退。夏季已经成为中国东部极端热浪和长江沿线洪水肆虐的代名词。为了缓解灾难的进一步恶化，中国和其他大国决定想办法遮蔽太阳光。

这曾是科幻小说中的场景，但现在科学家们正在考虑如何管理气候，以避免全球变暖带来的最严重的影响。

近年来，随着减少温室气体排放的机会愈发渺茫，地球工程已经成为主流科学辩论的议题。联合国政府间气候变化专门委员会（United Nations Intergovernmental Panel on Climate Change，以下简称 IPCC）撰写的一份报告草案显示，到 2040 年全球平均气温预计将上升超过 1.5 摄氏度——这是《巴黎协定》规定的温升限值。一旦超过，出现灾难性气候影响的风险将大大增加。

如果证明可行，地球工程可以通过暂时关闭全球恒温调节机制以

及减缓气候变化的影响，为各国赢得一些脱碳的时间。然而批评者认为，即便是研究这个话题也会产生“道德风险”，向公众发出错误信号，让他们认为可以依靠目前尚未证实的技术来修复气候变化。

中国比大多数国家都更容易受到气候变化相关极端天气事件的影响。中国政府目前正集中力量通过推动经济去碳化来减少排放，但 3 年前中国政府还启动了一个项目，研究地球工程在减缓气候变化方面的潜力。尽管该项目仍处于起步阶段，但却让人们对于中国是否将部署太阳能地球工程的问题提出了质疑。

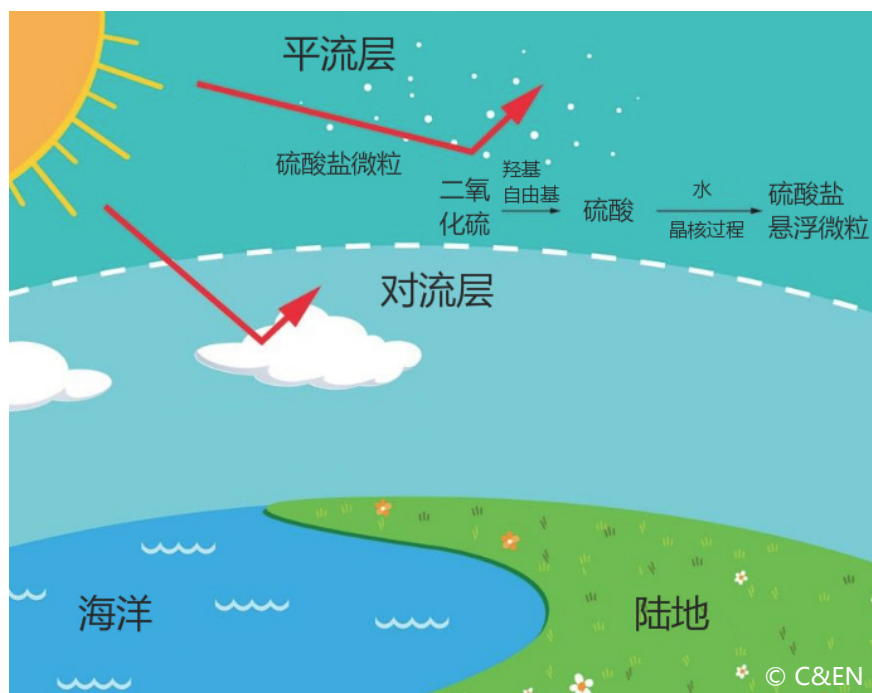
## 未知领域

地球工程是指人类主动大规模干预地球自然系统以抗击气候变化的活动，主要有两种方式：阻挡太阳光和吸收大气中的二氧化碳。中国

**地球工程：**概括性术语，涵盖人类大规模干预地球系统以抗击气候变化的全球性行动——分为两大类：太阳能地球工程（又称“太阳能辐射管理”）和二氧化碳清除。

**太阳能地球工程/太阳辐射管理：**将更多的太阳辐射反射到宇宙中的技术，可降低地球温度，缓解气候变化的症状（但不能根除其成因）。

**二氧化碳清除：**将二氧化碳从大气中清除的技术，可从根本上解决人为造成的气候变化成因。



太阳能地球工程的两大策略——喷洒硫酸盐气溶胶和增亮海洋云

科学家大多专注于研究阻挡阳光的技术，这种技术为迅速降低地球温度提供了可能，但随之而来的风险还需仔细研究。

太阳能地球工程还没有经过测试，但火山爆发却是对阻挡太阳光这种方式的一种自然模拟。1991年菲律宾皮纳图博火山爆发向大气中释放了二氧化硫，形成硫酸盐气溶胶，一定程度上导致太阳光的散射，因此1992至1993年间地球温度下降了约0.4摄氏度。科学家们建议用配有特殊装置的飞机在7万英尺的高空喷洒气溶胶，来复制这种火山效应。

这种方法能让地球迅速降温，但终究没有解决温室气体这一问题的根源所在。大气不会回到工业革命前的状态，二氧化碳将继续造成海洋酸化，并且对生态系统产生其他影响。虽然从理论上讲，可以同时采用二氧化碳清除技术吸收大气中

的二氧化碳，但这些技术也只处于试行阶段，面临着巨大的障碍。

### 权衡风险

北京师范大学英国籍教授、中国地球工程研究项目主持人约翰·摩尔说，太阳能地球工程太“疯狂”

“唯一理智的解决办法就是停止化石燃料燃烧。”他说。

摩尔的观点在这一课题的研究人员中很常见，他们有的人对扮演上帝一样的角色去修补气候感到不适，有的则害怕自己会在不经意间研发出可以用做武器的技术。然而，科学家们的研究是以太太阳能地球工程造成的风险可能远小于快速升温的风险这个假设为前提的。根据联合国环境规划署的预测，按照目前各国政府承诺的减排量，到本世纪末全球温度将至少上升3摄氏度。

众所周知，太阳能地球工程会

带来许多健康和环境风险，包括降雨减少，以及臭氧耗竭导致皮肤癌发病率增高。

这些风险的严重性将取决于太阳能地球工程的部署程度。例如，如果只是适度部署，亚洲季风降水量的变化将非常小，但如果太阳能地球工程的部署规模大到足以抵消所有的全球变暖，降水量就会大大减少。

这些都是已知的风险，但摩尔提醒要注意“未知的未知数”。

中国的研究项目正在调查太阳能地球工程的风险和潜在影响，该项目由国家科技部资助，研究经费达1700万元人民币。30多名科研人员组成的团队重点研究治理问题，并通过电脑建模理解地球工程的影响，尤其是对中国的影响。例如，其中一项研究模拟了向大气层喷射硫酸盐气溶胶将如何让处于不稳定状态的喜马拉雅冰川融化得慢一些，而这些冰川的安危事关中国的水安全。

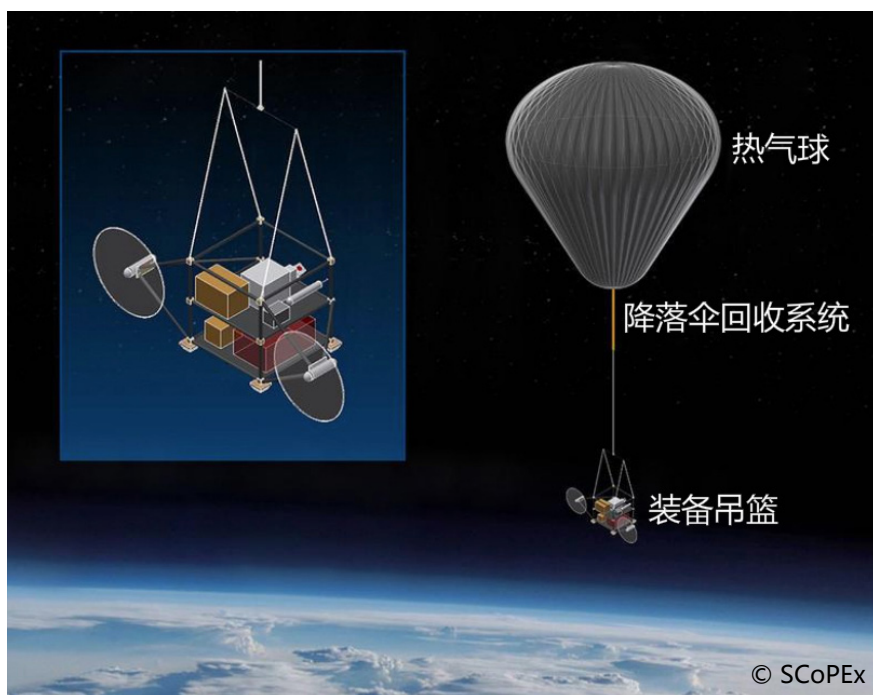
项目首席中国科学家、浙江大学地球科学教授、中国IPCC报告作者之一的曹龙很谨慎地把研究和部署区分开来。

“我们做这个研究不代表我们以后就一定要实施地球工程，但是对这个研究本身是有意义的。”他说。

### 飞向太阳

就在中国研究人员专注于通过建模研究地球工程的影响时，哈佛大学的科学家们正准备开始首次平流层太阳能地球工程实验，此次实验是一个由私人出资2000万美元建立的项目的一部分。

今年，他们计划向亚利桑那州



哈佛科学家们计划发射进入平流层的气球

上空发射一个装有测量设备的气球。首次实验中，气球会向大气中喷洒冰晶，并从微观物理学的角度研究由此产生的一系列影响。但哈佛的科学家们最终可能会向平流层喷洒硫酸盐，从而研究皮纳图博火山喷发后呈现的地球工程方法。

这个实验符合联合国生物多样性会议制定的地球工程野外实验国际指南，该指南允许进行小规模野外研究，“但须事先对潜在的环境影响进行彻底评估。”

中国会效仿吗？摩尔说一些中国科学家已经表示有兴趣在建模结果的基础上进行野外实验。曹龙最近与他人合作撰写了一篇关于 前沿“鸡尾酒

地球工程”，也就是结合多个太阳能地球工程解决方案的文章。然而，他认为这些概念仍是理论上的。“我认为，未来近期数年内地球工程研究都会通过气候模式模拟进行，因为野外实验的风险太大了。”

哈佛大学实验的领衔科学家之一大卫·基思说，野外实验可以帮助科学家修正自己的模型，增强他们对风险的理解。如果中国要做的是哈佛大学做的这种没有任何实质性风险的野外研究，基思说，他依然会持支持态度。他认为这类研究是科学进程的一个重要部分。但批评人士认为，实验如果证明地球工程的风险非常小，就会增加其部署的可能性。

## 棘手的治理问题

管理太阳能地球工程的发展和使用的全球综合性治理机制还处于起步阶段。

专注治理问题的中国研究项目研究人员陈迎表示，在现阶段“治理的目的在于防止技术滥用，而不是为了促进实施。”

太阳能地球工程的成本可以很低，一个国家或者富裕的个人都能够独立运营数年。为了尽量降低风险，“卡内基气候地球工程治理倡议”（Carnegie Climate Geoengineering Governance Initiative）鼓励各国达成一致，在没有充分了解风险和效益以及建立治理系统之前，不部署太阳能地球工程。为了推进这一议程，“卡内基倡议”提倡各国在 2019 年联合国环境大会上提出一项决议。

但治理会采取何种形式呢？“如果真的到了这一步，那这将是人类所做过的最为全球性的事情，需要采取我们目前还没有的全球性解决方案。”“卡内基倡议”主管扎诺斯·帕兹托说。

鉴于有必要遏制这类高风险的实验，帕兹托认为需要采取与防止核扩散相类似的手段。当然，地球工程的目的是解决全球性的问题，而不是成为武器。牛津大学学者设计的一套治理原则建议，应该将地球工程作为一项公共物品来治理，需在技术发展过程中严格控制其商业化。从这些概念

如果证明可行，地球工程可以通过暂时关闭全球恒温调节机制以及减缓气候变化的影响，为各国赢得一些脱碳的时间。然而批评者认为，即便是研究这个话题也会产生“道德风险”，向公众发出错误信号。





发展到正式的全球治理框架可能需要数十年时间，帕兹托说。

若要部署太阳能地球工程，就需要对其进行长期稳定的管理来逐步调整其强度，以防止发生“边界激波”的风险，即全球气温迅速下降，可能会对生态系统造成灾难性的影响。

### 提高公众参与

“牛津原则”呼吁“公众参与地球工程的决策过程”。研究人员最好是获得所有可能受研究活动影响人员的事先知情同意，任何大规模的部署也需事先获得公众同意。帕兹托说，公众参与是必不可少的，但这一过程不需要是放之四海皆准的，它可以根据不同的文化和政治环境，因地制宜地作出调整。

中国的研究项目仍处于起步阶段，国家尚未明说是否以及如何协调此类公众参与。到目前为止，相关讨论大多局限在学界内部。

“(中国)大学中层中有些人是相当反对地球工程的，”约翰·摩尔说，但相比公开反对地球工程研究和部署的西方学者，他们的反对没有那么直白。

陈迎说，一些中国学者对太阳能地球工程的研究持谨慎态度，他们认为太阳能地球工程是不现实的，

至少是很远的事情，应该优先研究急迫的现实问题。

除了这些学术辩论，外界对此鲜有讨论。陈迎说，中国的非政府组织还没有表明对地球工程的立场，公众对这一问题则知之甚少。

### 中国领头？

今年4月《自然》杂志发表的一篇评论中，包括约翰·摩尔在内的来自世界各地的科学家呼吁受气候变化影响最大的发展中国家率先进行太阳能地球工程研究。

作为唯一一个拥有此类研究项目的发展中国家，中国首当其冲。

然而，中国研究团队的成员在2016年的一篇文章中称，中国不会在地球工程的发展过程中扮演领导者的角色。

他们在文章中写道，中国在国际舞台上从来没有扮演过发起者的角色，比如说，在联合国安理会上就很少提出决议。此外，控制空气污染一直是中国摆脱煤炭燃烧、实现绿色转型的主要动力。太阳能地球工程或许能阻止温度上升，但没办法解决中国因燃煤电站释放的烟雾而引发的公共健康危机。

中国官员已经开始研究地球工程。去年帕兹托的中国之行促使外交部、科技部和国家发展和改革委员会

官员举行了一次有关太阳能地球工程治理的高级别会议。

然而，政府官员没有就地球工程问题发表正式的声明，因此中国未来对地球工程研究的立场仍不明朗，更不用说部署的可能性了。

### 1.5度温控

在不使用地球工程的情况下，保持全球气温上升低于1.5摄氏度的可能性依然存在。最近一项研究表明，通过大力提高能源效率和植树造林就可以达到实现这一目标所需的减排量。

然而，IPCC的大多数情境分析都采用了地球工程的另一种方法——二氧化碳清除——来减少排放，并且能够在一段时间的“反跳”之后让全球气温上升重新回到1.5摄氏度的范围以内。由于太阳能地球工程的方法目前尚不明朗，因此IPCC目前仍未将其纳入自己的减排方案。

未来如果有研究表明太阳能地球工程的风险非常小，人类将有能力决定是否在全球范围内对气候进行控制。就目前而言，太阳能地球工程风险不明，技术未经认证，而且各国仍有希望通过迅速减排来避免灾难性的影响。<sup>⑤</sup>

白莉莉，中外对话研究员，北京能源网络(Beijing Energy Network)执行制作

# Solar geoengineering rises in the East

China is cautiously engaging in one of the most important scientific debates of the century

□ Lili Pike



© Pixnio

*Chinese researchers are studying how geoengineering could be used to cool the earth*

The year is 2040 and the planet is hot, more than 1.5 degrees Celsius warmer on average than before the start of the Industrial Revolution. Residents of coastal cities are retreating to higher ground as rising tides encroach on their neighbourhoods. Summer has become synonymous with extreme heat waves in Eastern China and violent floods

along the Yangtze River. To mitigate further catastrophe, China and other world powers decide to dim the sun.

Once limited to the realm of science fiction, scientists are now considering how to engineer the climate to avert the worst impacts of global warming.

Geoengineering has entered mainstream scientific debate



**Geoengineering:** An umbrella term for intentional large-scale human interference in the Earth system to combat climate change – broken down into two main classes: solar geoengineering (also referred to as “solar radiation management”) and carbon dioxide removal.

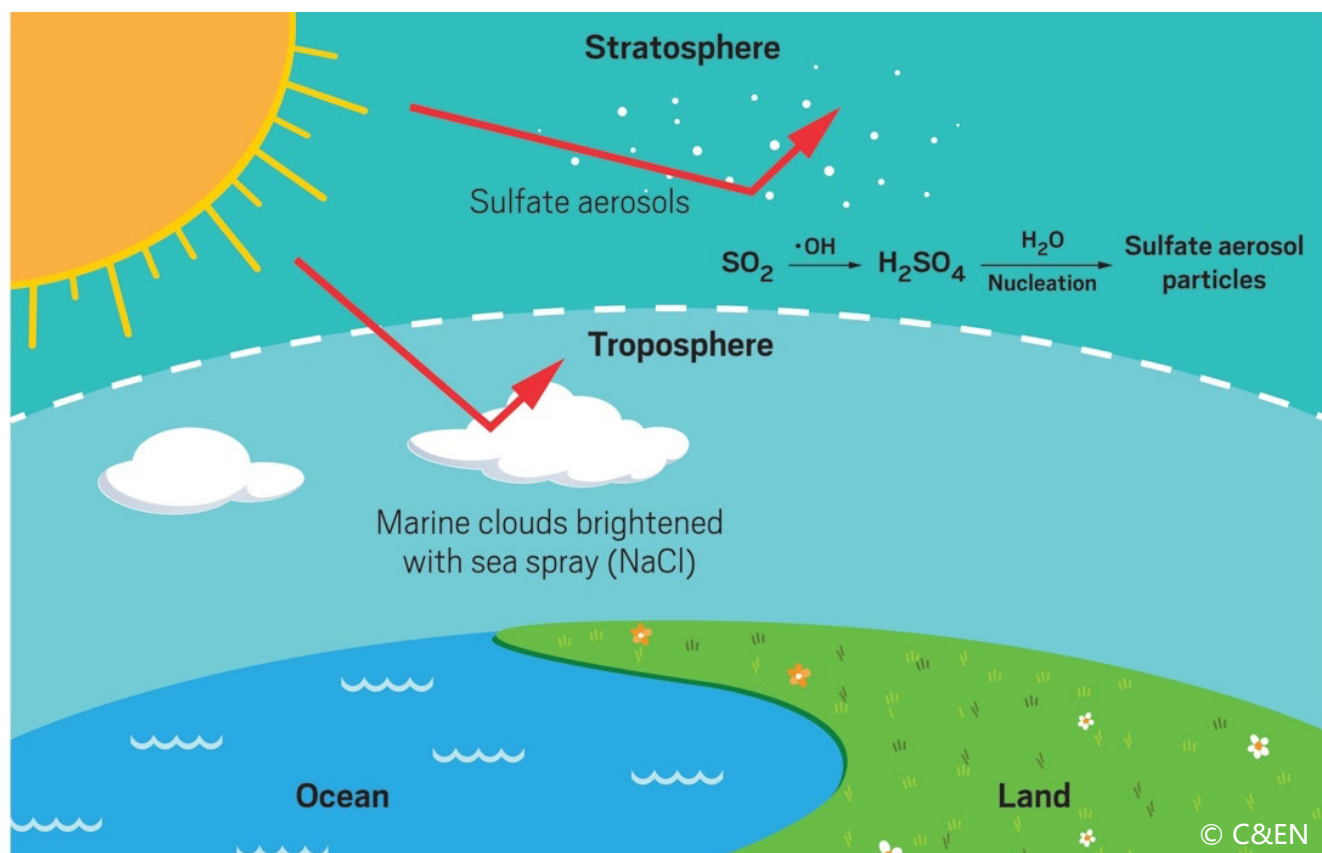
**Solar geoengineering/solar radiation management:** Techniques that reflect solar radiation into space, reducing temperatures and addressing a symptom (but not cause) of climate change.

**Carbon dioxide removal:** Techniques that remove CO<sub>2</sub> from the atmosphere, thus addressing the primary cause of anthropogenic climate change.

in recent years as the window to reduce greenhouse gas emissions narrows. A draft report by the United Nations Intergovernmental Panel on Climate Change (IPCC) shows that by 2040 the global average temperature is projected to exceed 1.5 degrees Celsius above pre-industrial levels. This is the threshold established by the Paris Agreement after which the risk of catastrophic climate impacts increases.

If it proves feasible, geoengineering could buy nations some time to decarbonise by temporarily turning down the global thermostat and slowing the impacts of climate change. However, critics argue that even researching it creates a moral hazard because it sends a false signal to the public that a hitherto unproven technological fix can be relied on.

China is more vulnerable than most countries to extreme weather events linked to a changing climate. The government is focusing on reducing emissions by decarbonising the economy, but it has also launched a research programme to study geoengineering’s potential to



The two main approaches to solar geoengineering: sulfate aerosol injection and marine cloud brightening

mitigate climate change. Although it is still in its infancy, the three-year-old programme raises the question of whether China would deploy solar geoengineering.

### Uncharted territory

Geoengineering involves the deliberate, large-scale intervention in the Earth's natural systems to counteract climate change. It works in two main ways: blocking sunlight and sucking carbon dioxide out of the atmosphere. Scientists in China have largely focused on techniques to block the sun because they offer the potential to rapidly cool the planet. But they pose risks that require careful study.

Solar geoengineering is untested but volcanic eruptions are a natural analogue for one approach. The 1991 eruption of Mount Pinatubo in the Philippines released sulfur dioxide into the atmosphere that formed sulfate aerosols. These scattered sunlight to the extent that the Earth cooled by around 0.4 degrees Celsius from 1992-1993. Scientists have proposed replicating the volcano effect by spraying aerosols out of specially equipped planes at 70,000 feet.

This could quickly cool the planet, but it would not target the greenhouse gases that are the source of the problem. The atmosphere would not return to a pre-industrial state because carbon dioxide would continue to acidify the ocean and have other effects on ecosystems. While carbon dioxide removal technologies could, in theory, be employed simultaneously to draw the accumulated gases out of the atmosphere, these technologies are also only just being piloted and face significant barriers.

### Choosing between risks

Solar geoengineering is “insane” according to John Moore, a British scientist at Beijing Normal University (BNU) who leads China's geoengineering research programme.

“The only sane solution is to stop burning fossil fuels,” he says.

Moore's sentiment is common among those researching the topic. Concerns range from discomfort about playing a god-like role by tinkering with the climate to fears of

“Scientists have proposed replicating the volcano effect by spraying aerosols out of specially equipped planes.”

inadvertently developing a weaponisable technology. Nonetheless, scientists pursue this research under the hypothesis that the risks posed by solar engineering may be less grave than those posed by a rapid temperature rise – under current government commitments, the United Nations Environment Programme projects the world is set to warm by at least 3 degrees Celsius by the end of the century.

Solar geoengineering is known to pose myriad health and environmental risks, from decreased rainfall to heightened skin cancer rates due to ozone depletion.

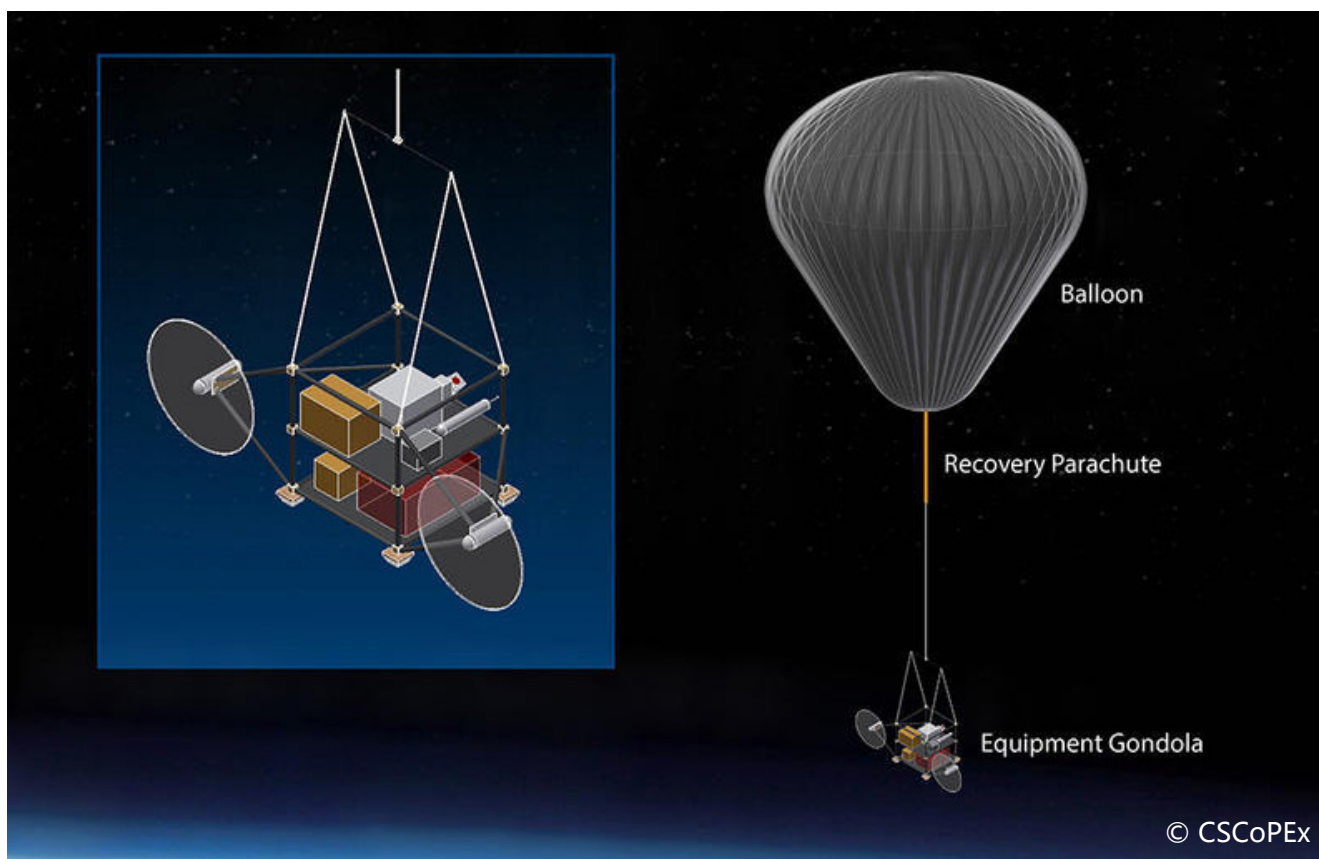
The severity of these risks would depend on the degree of solar geoengineering deployed. Changes in Asia's monsoon precipitation, for instance, would be minimal under a moderate deployment scenario whereas precipitation could be reduced significantly if solar geoengineering were to offset all global warming.

These are some of the known risks, but Moore warns of “unknown unknowns”.

The Chinese research programme is investigating the risks and potential impacts. It is funded by a 17 million yuan (US\$3 million) grant from the Ministry of Science and Technology. The team of over thirty researchers has focused on governance issues and computer modelling to understand geoengineering's impacts, particularly on China. One of their studies, for instance, models how sulfate aerosol injection could slow the melting of the Himalayan glaciers, which are key to China's water security.

The lead Chinese scientist on the team, Cao Long, an Earth sciences professor at Zhejiang University and one of China's IPCC report authors, is careful to distinguish research from deployment.

“Doing this research does not mean that we will definitely



*The two main approaches to solar geoengineering: sulfate aerosol injection and marine cloud brightening*

implement geoengineering in the future,” he says. “The research itself has scientific value.”

### Flying close to the sun

While researchers in China focus on modelling impacts, scientists at Harvard University are preparing for the first solar geoengineering field experiments in the stratosphere as part of a privately-funded US\$20 million project.

This year, they plan to launch a balloon fitted with measurement equipment into the stratosphere over Arizona. For the first experiment, the balloon will release ice into the atmosphere to study the resulting microphysics. But eventually Harvard scientists may release sulfates to study the geoengineering approach exhibited after the Mt Pinatubo eruption.

This experiment falls within international guidelines for geoengineering field experimentation established under the UN Conference for Biological Diversity (CBD). The

guidance permits small-scale field studies “subject to a thorough prior assessment of the potential impacts on the environment”.

Will China follow? Moore says that some Chinese scientists have expressed interest in field experimentation to build on their modelling results. However, Cao Long, who recently co-authored a paper on cutting-edge “cocktail geoengineering” – combining multiple solar geoengineering solutions – said the concepts remain theoretical.

“I think the majority of our research in the next two to three years will definitely be focused on computer modelling because the risks of field experiments are too great,” he says.

David Keith, one of the scientists leading Harvard’s experiments, says that field experiments can help scientists refine their models and improve their understanding of risks. For experiments like Harvard’s that pose no physical risks, Keith says his support for such studies would be unlikely to change in the Chinese context. He sees them as



an essential part of the scientific process. But critics argue that if experiments show minimal risks, they could make deployment more likely.

## A thorny governance problem

A comprehensive global governance regime to manage the development and use of solar geoengineering is still in its early stages.

Chen Ying, a project coordinator in China's research programme focused on governance, says that at this stage, "governance is to guard against the abuse of the technology, not to facilitate implementation."

Solar geoengineering could be inexpensive enough for a single country or wealthy individual to go it alone for a number of years. To minimise this risk, the Carnegie Climate Geoengineering Governance Initiative is encouraging countries to agree not to deploy solar geoengineering until the risks and benefits are sufficiently known and a governance system has been established. To start this process the Carnegie Initiative is advocating for countries to introduce a resolution in the UN Environment Assembly in 2019.

But what shape might governance take? "This will be the most global thing humanity has ever done if we ever get there, and therefore, it will require a kind of global solution that we just don't have on the table right now," says Janos Pasztor, the director of the Carnegie Initiative.

Given the need to deter high-risk experiments, he sees parallels with nuclear non-proliferation. Of course, geoengineering is intended to be a solution to a global problem, not a weapon. A set of governance principles

designed by Oxford academics suggest that it be governed as a public good with tight controls on commercialisation as technologies develop. Moving from these concepts to a formalised global governance structure would likely take decades, according to Pasztor.

If solar geoengineering were deployed then long-term stable management would also be needed to ramp it up and down gradually. Otherwise there is a risk of "termination shock" whereby global temperatures snap back rapidly, with potentially devastating impacts on ecosystems.

## Engaging the public

The Oxford Principles call for "public participation in geoengineering decision-making". Ideally researchers would obtain the prior informed consent of anyone potentially affected by research activities and the public would consent before any large-scale deployment. Pasztor says that public engagement is essential but the process does not have to be one-size-fits-all and can be adapted to different cultural and political environments.

China's research programme is still in its infancy and the country has not indicated whether and how it would orchestrate such public engagement. So far, discussion has mostly occurred in academic circles.

"There are people at the mid-level in universities [in China] that are fairly anti-geoengineering," says John Moore, but they have been less outspoken than some Western academics who have publicly opposed research and deployment.

According to Chen Ying, some of these Chinese academics are wary of solar geoengineering research

because they do not believe it should be prioritised over more immediate issues.

Outside these academic debates, the conversation remains quiet. Chen says that Chinese non-governmental organisations have not taken a stance on their research and that the public is not well informed on the issue.

### Will China lead?

In a comment published by Nature in April, scientists from around the world, including John Moore, called on developing countries to spearhead solar geoengineering research as they stand to be impacted most by climate change.

As the only developing country with a research programme, China is positioned to lead this shift.

However, in a 2016 article, members of the Chinese research team argued that China would not take a leadership role in geoengineering development.

They wrote that China has not historically been a leader on the international stage. Furthermore, air pollution control has been a primary motivation for China's transition away from coal burning – solar geoengineering might stop the temperature from rising, but it would not solve China's public health crisis brought about by smog from coal-fired power plants.

Chinese officials have begun to look into geoengineering. Pasztor's visit to China last year prompted a high-level meeting of officials from the Foreign Affairs and Science and Technology ministries and the National Development and Reform Commission to discuss solar geoengineering governance.

However, government officials have made no formal statements on geoengineering, so the country's future position on research, not to mention possible deployment, remains unclear.

### Staying below 1.5 degrees

Scenarios that keep the world below a 1.5-degree temperature rise without employing geoengineering still exist. One recent study showed that the emission reductions necessary to meet this target could be achieved through aggressive increases in energy efficiency and afforestation alone.

However, the majority of IPCC scenarios enlist another geoengineering approach – carbon dioxide removal – to draw down emissions and bring the Earth back to 1.5 degrees Celsius after a period of “overshoot”. The IPCC has yet to factor the use of solar geoengineering into its emissions reduction scenarios as the approaches are still considered too obscure.

In the future, if research shows that solar geoengineering risks are minimal, humankind will be in a position to decide whether to exert control over the climate on a global scale. For now, the risks are unclear and the technologies unproven. Nations still have a narrow window to avert catastrophic impacts by rapidly reducing emissions. ☞

*Lili Pike is a researcher for chinadialogue and the executive producer of the Beijing Energy Network's podcast, Environment China.*



# 中国公众是否真的关注气候变化？

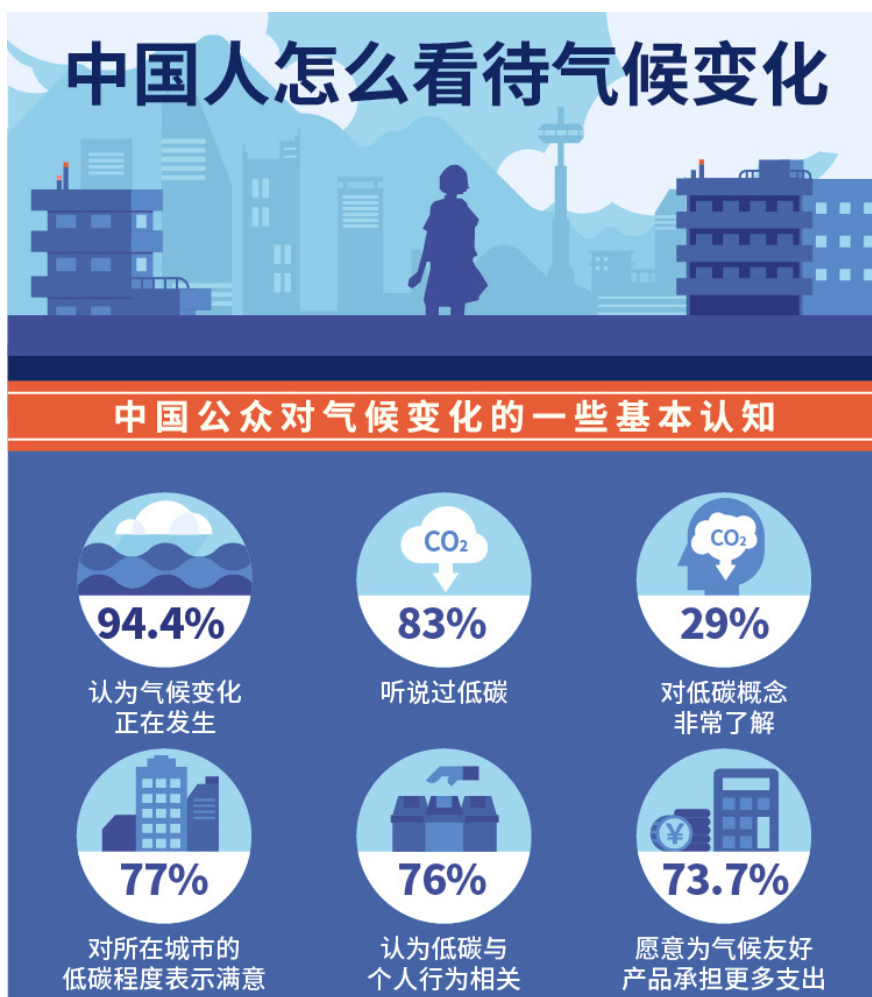
两项最近的调查表明，中国人关注气候变化并愿意为之做出一定程度的行为改变。

□ 李 婧

中国刚刚经历了一个“多事之夏”：创纪录的热浪、致命的山洪和台风。气候变化的影响无论城乡都能感到，而且引发了公众对探讨气候变化的更大兴趣。但这种好奇心的爆发是不是昙花一现？换句话说，中国人民是否真的关注气候变化？

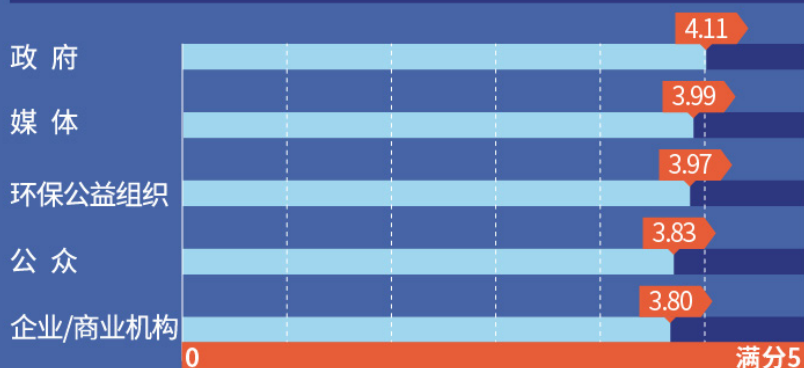
这个问题的答案是肯定的。中国政府在努力确立自身应对全球变暖的国际领袖地位，而最近的调查表明公众也都支持政府的行动。2017年的一项全国调查中，94.4%的受访者认为气候变化正在发生，66%认为这主要是由人类活动造成的。

中国气候传播项目中心和绿色创新发展中心分别在2017年和2018年就这一主题进行了一次调查，调查结果均表明中国人对气候变化的态度是由政府主导的高调行动和公众对于空气污染的关切推动的。



## 中国公众对政府的气候变化政策高度支持 但同时也更依赖政府采取行动

### 谁应该在应对气候变化问题上做得更多



### 接近94%的受访者支持中国政府继续留在《巴黎气候协定》中



### 接近97%的受访者对政府控制温室气体排放的政策表示支持



## 中国公众更担心气候变化会使空气污染恶化

### 最担心哪一种气候变化带来的风险



**72.6%**

受访者认为空气污染和  
气候变化具有协同效应

## 政府的主导作用

2009年哥本哈根气候峰会之后，由于此次峰会上达成约束性国际气候协议的希望破灭，再加上空气污染等国内环境问题也变得更加迫切，中国开始实施一系列国家政策和行动将经济增长与温室气体排放脱钩。

政府主导的促进节能、推动低碳发展与生活方式的行动在媒体上广泛宣传。中国在2015年达成巴黎气候协定过程中发挥的积极作用在国内也是一个受到高度赞扬的政治举动。

所以，当被问及谁应该在解决气候变化中发挥更大作用时，绿色创新发展中心调查的受访者压倒性地回答“政府”也就不足为奇了。在从1到5的打分中，政府以4.11分位居榜首，接下来是环境团体、个人和企业。

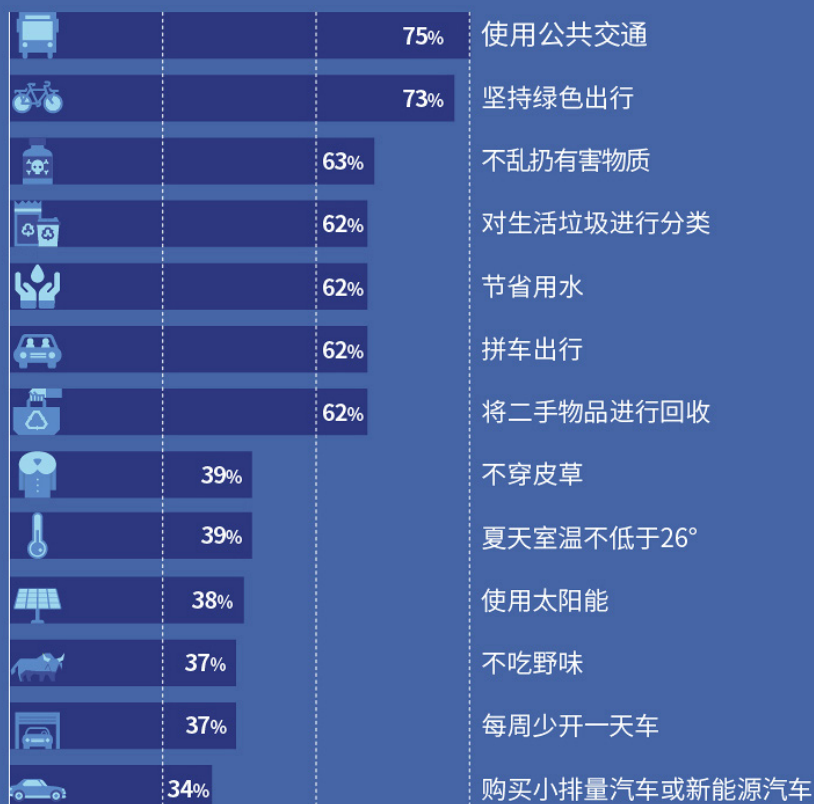
根据绿色创新发展中心的调查结果，与政府保持一致的思维方式也确保了公众对政府限制温室气体排放（97%）和继续参与巴黎协定（94%）的大力支持。

但是，在对这些反馈进行分析时有一点必须铭记：公众对被问的内容未必完全确切了解。比如，资深科学报道记者贾鹤鹏指出，人们可能很难区分碳减排目标和碳强度目标（后者指单位国内生产总值的碳排放量）。

字面上看起来差不多的政策会产生截然不同的社会经济影响。绿色创新发展中心关于公众对低碳城市认知的调查印证了公众对气候政策的“一知半解”：83%的受访者表示他们“知道”低碳概念，但只有29%的人足够自信地说他们对此“非常了解”。

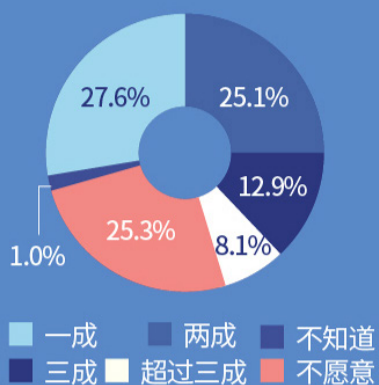
## 然而，当涉及到个体行为时

公众更愿意从“小事”做起，而面对需要改变生活方式或生活习惯的行为时，公众表现出的参与度有限。在调查中，公众对各项低碳行为的参与度如下：

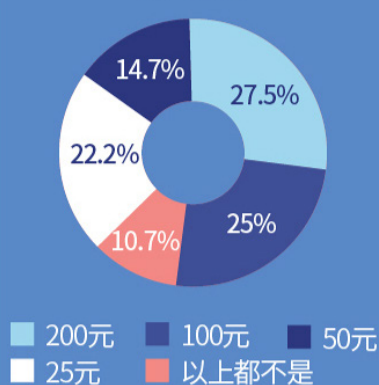


不过，中国公众愿意为气候友好产品、中和碳排放负担额外的开销

愿为气候友好产品额外支付



每年愿为中和自己的碳排放额外支付



## 与空气污染的联系

在公众眼中，气候变化与空气污染密切相关。根据中国气候传播项目中心的调查，72.6%的受访者认为，两者存在关联。受访者们还说，不断恶化的空气质量是他们最担忧的气候风险，接下来是疾病、干旱、洪水、冰川融化、饥谨和粮食短缺等增加的风险。这种观念可能来自公众对中国依靠煤炭作为主要能源的认识，以及对空气污染相关健康风险的高度关切。

在绿色创新发展中心的调查中，空气质量被视为城市低碳发展最重要的一个方面，超过了公共交通、耗水程度和废物处理。北京和广州等较大城市的居民对于现状的满意度最低。

个人层面：  
小改变更易被接受

绿色创新发展中心的调查也请中国受访者对他们最可能采取的气候变化应对措施进行排名。尽管中国公众都能接受公共交通和垃圾分类等简单措施，但对购买低排放汽车和改变膳食结构等生活方式变化的热情则要低得多。

但如果用钱包来投票，中国公众则很乐于花钱抵消碳排放，有超过一半的受访者情愿每年在这方面花费100元（15美元）以上。这与之前的调查结果一致，即中国消费者愿意花更多的钱购买可再生来源的电力，这意味着在中国，利用消费者不断增长的购买力来开展低碳行动有较大的空间。

李婧，自由撰稿人，关注环境与气候议题



# Does the Chinese public care about climate change?

Recent surveys reveal that people are concerned and willing to make small lifestyle changes

□ Li Jing

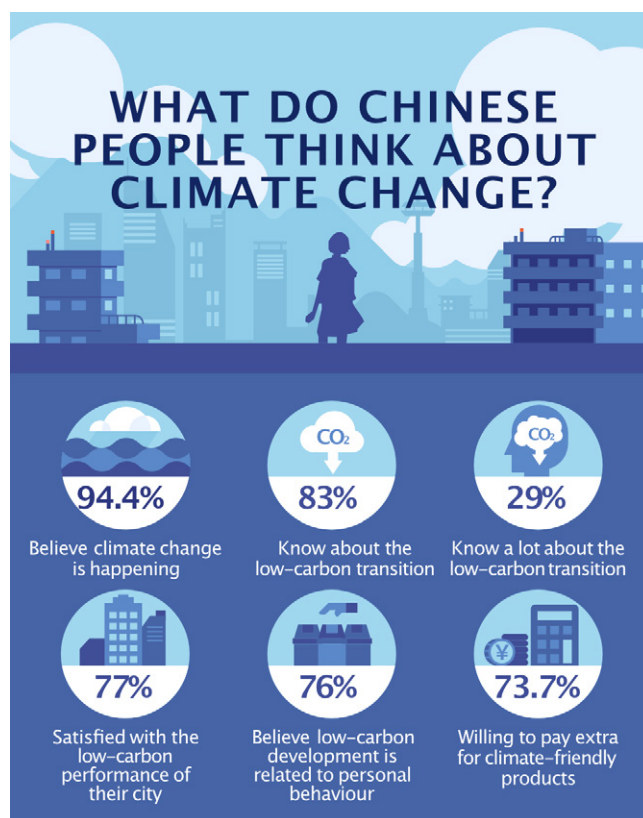
China has had an eventful summer marked by record-setting heatwaves, deadly flash floods, and typhoons. The impacts of climate change have been felt in cities and the countryside alike, and seem to have triggered greater public interest in discussing climate change. But will this outburst of curiosity be short-lived? In other words, do Chinese people really care about climate change?

Yes, they do. As the government tries to position itself as an international leader in responding to global warming, recent surveys show that the public supports the government's actions. A reassuring 94.4% of respondents to a national survey in 2017 said that climate change is happening, and 66% believe it is mostly caused by human activities.

Two separate surveys on this topic, one carried out by the China Centre for Climate Change Communication (China 4C) in 2017, and the other by the Innovative Green Development Program (iGDP) in 2018, show that Chinese attitudes to climate change are being driven by high-profile government-led campaigns and public concern about air pollution.

## Government front and centre

A series of national policies and campaigns have been launched in China to decouple economic growth from greenhouse gas emissions. This began after the 2009 Copenhagen climate summit, when hope of a binding



international climate regime was dashed, and domestic environmental issues such as air pollution became more pressing.

Government-led campaigns to promote energy conservation and low-carbon development and lifestyles have been widely publicised in the media. As has the role

that China played in forging the Paris Climate Agreement in 2015 – this was a highly acclaimed political event back home.

So it is not surprising that when asked who should play a greater role in tackling climate change, respondents to the iGDP survey overwhelmingly said that it should be the government. On a scale of 1 to 5, government received 4.11, followed by the media, environmental groups, individuals and enterprises.

This mindset has also secured public support for the government to limit greenhouse gas emissions (97%), and remain in the Paris Agreement (94%), according to iGDP.

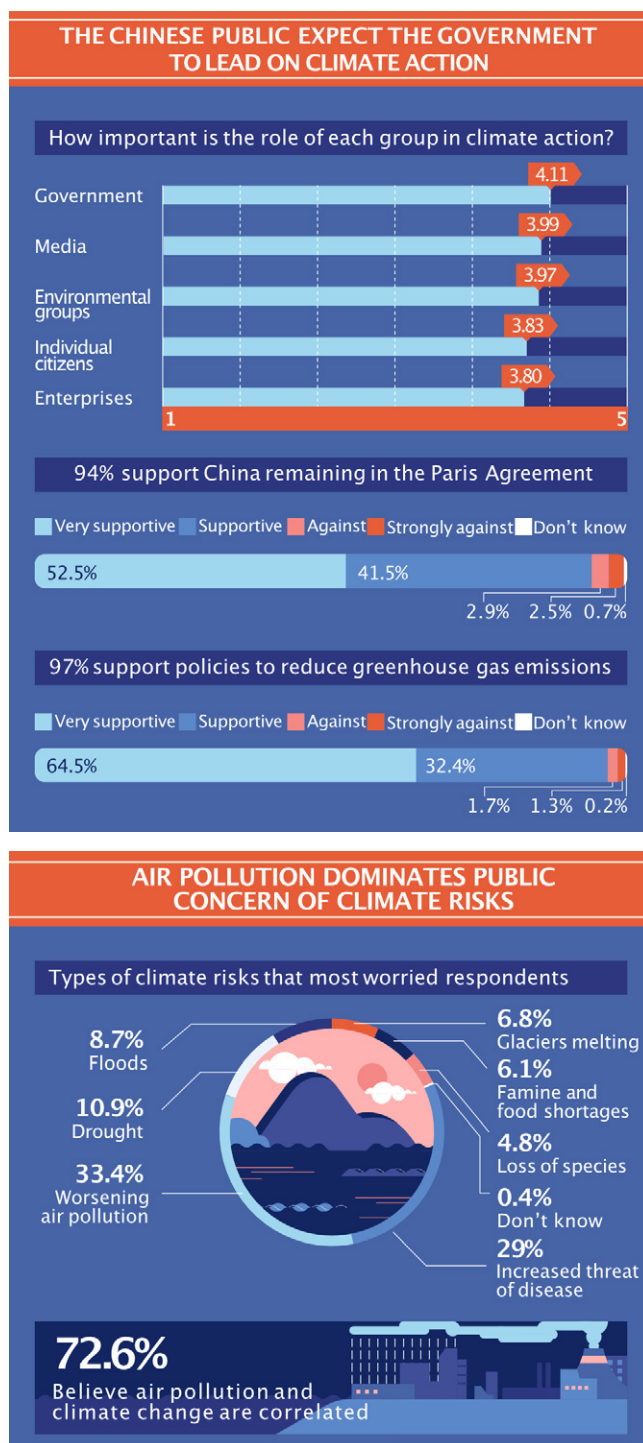
However, when analysing these responses there is an important caveat: the public might not fully understand exactly what they're being asked. Jia Hepeng, former editor-in-chief of Science News, pointed out, for example, that people might have difficulty differentiating carbon reduction targets from carbon intensity targets (the latter being the amount of carbon emitted per unit of gross domestic product).

The policies can have radically different socio-economic impacts. The iGDP survey of public perceptions on low-carbon cities appears to bear out this common misunderstanding: while 83% of respondents say they “know about” the concept of going low-carbon, only 29% are confident enough to say they “know very well” about it.

## Linkage with air pollution

Climate change is closely linked with air pollution in the public's eye, with 72.6% of respondents saying the two issues are connected, according to the China 4C survey. Respondents also said that worsening air quality is the climate risk they are most worried about, followed by increased risk of disease, drought, flooding, glacier melt, famine and food shortages. This perception might come from the public's awareness of China's dependence on coal as a primary source of energy, and heightened concern about the health risks associated with air pollution.

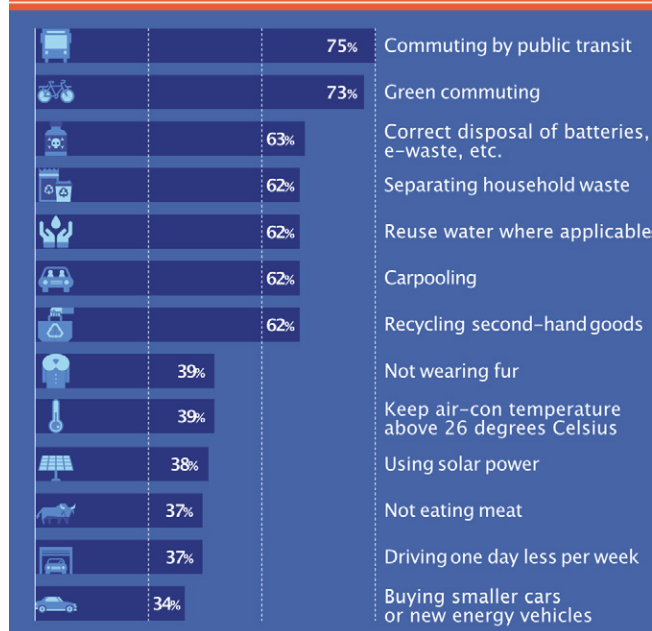
In the iGDP survey, air quality is also viewed as the most important aspect of a city's low-carbon development,



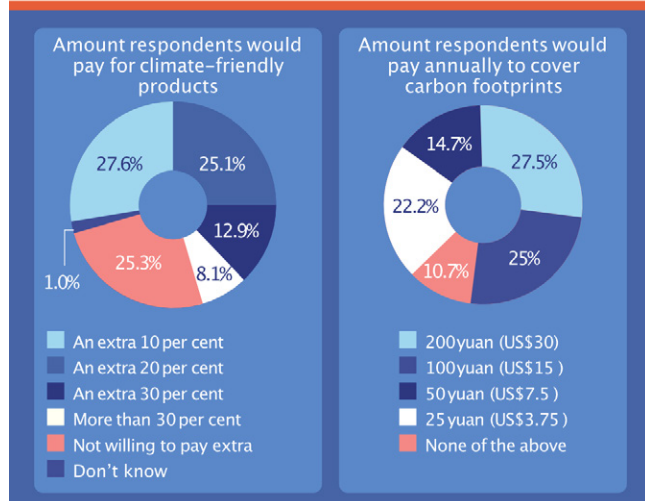
compared to public transportation, water consumption levels and its handling of waste. Residents in bigger cities such as Beijing and Guangzhou are the least content with the status quo.



### CHINESE PEOPLE ARE MOST WILLING TO MAKE SMALL LIFESTYLE CHANGES



### CHINESE PEOPLE ARE WILLING TO PAY MORE FOR CLIMATE-FRIENDLY PRODUCTS



### Small steps more popular

The iGDP survey also asked Chinese interviewees to rank actions they were most likely to take to address climate change. While the Chinese public are receptive to easy steps such as commuting with public transportation and garbage sorting, more substantial changes to behaviour, such as buying low-emission cars and making dietary changes, are perceived with much less enthusiasm.

But when it comes to making a difference with their wallets, the Chinese public is open to spending money to offset carbon emissions, with over half of respondents willing to spend more than 100 yuan (US\$15) annually to do so. This is in line with previous polling results that found urban Chinese consumers willing to pay more for electricity from renewable sources, implying space for low-carbon initiatives that harness the rising purchasing power of Chinese consumers. ☺

#### About the surveys

The *Climate Change in the Chinese Mind 2017* survey was conducted by the China Centre for Climate Change Communication (China 4C) with a computer-assisted telephone survey in 2017. A total of 4,025 people, aged between 18 to 70, were surveyed via mobile phone (84.6%) and landline (15.4%). The respondents were from 336 Chinese cities.

*Survey of Public Perceptions on Low-Carbon Cities* was conducted by Innovative Green Development Program (iGDP), a Chinese think tank, in 2018 as part of its research on China's Low-Carbon & Green Index for Cities (LOGIC). LOGIC rated 115 Chinese cities on their performance. A total of 2,000 residents from 20 cities with the highest LOGIC rating were selected for the survey. Respondents aged between 18 and 55 were surveyed online, while the rest aged between 56 and 70 were interviewed offline.

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

# 高温退下后， 气候传播该做些什么？

现象级的 33 天连续高温带来了气候变化讨论的高潮，  
而武毅秀关心的是气候传播下一个阶段的样子。

□ 武毅秀

**“北**极冻土融化，封存的巨型病毒或将复苏”，“或许在我们有生之年，再也看不到北极熊了”，“44.4 度！乾隆爷遭遇史上最高温”（编辑注：两部清宫主题网剧正在中国热播）……这个夏天，围绕着高温现象产生的热帖、甚至“段子”出现了井喷。

于是，我们这些气候传播人的认知也在受到挑战。一直以来，气候变化不好“卖”恐怕是全世界传播工作者的共识。这不难理解：气候科学艰涩难懂，气候谈判理解起来也有专业门槛，极端高温天气这样的热点事件又不好直接解读成气候变化。

所以，怎么去把气候变化变成“热点”，特别是在气候行动主要来自于国家层面的中国，如何让公众

也看见、关心气候变化，一直是传播工作的难点。

但当高温让全球变暖一不小心真的成为了中国国内的舆论热点，当公众主动走近气候话题，气候传播者又能利用这一契机讲述哪些新的故事呢？

## 今夏的高温讨论 “热度”不一般

其实，近几年，每年夏天有关高温的新闻都会或多或少有所爆发，然而直到今夏，关于高温的讨论才第一次转化为对全球变暖的焦虑。

这或许得益于进入八月以来，愈演愈烈的全球热浪使得世界各地的很多媒体将本轮高温的讨论放入

了全球的背景下：从北欧到日本，“环球同此炎热”，使得高温不再是一个局部、暂时的天气现象，而变成了一个普遍、全球范围的极端天气事件。这直接带动了公众对于“全球变暖”现象的关注和忧虑。

在中国国内，8 月 4 日中新网一篇“欧洲多地出现极端高温天气，北极圈内出现 32℃ 高温”的文章颠覆了人们对于凉爽北极圈的固有认识；与此同时，新华社关于全球各地高温引发山火和鱼类死亡等灾难的新闻综述也给人们呈现了全球变暖的恶果。

此外，今年夏天确实热得格外持久。在中国，截至 8 月 15 日，中央气象台已经连续 33 天发布高温黄色预警，这意味着日最高气温连续 33 天在 35℃ 以上。连续一个月不间断

在高温天气再度来临之时，气候传播者要做的也就不仅仅是传达公众气候变化的现象本身。在个人生活方式的层面，传播者也需要提醒公众对更糟糕的天气做好应对的准备。

断的高温和闷热，让人们不得不去思考，高温是否已成常态。

因此不难理解，在本轮有关高温的讨论中，为何“全球变暖”这一话题的热度首次超过了对于“高温天气”的关注。例如，在中国人最常用的搜索引擎百度上，“全球变暖”这一关键词的搜索热度不仅远远超过了过去的七个夏天，甚至远远超过“高温天气”的热度。

## 越来越有信心的气候归因判断

事实上，近年来，随着气候模型研究的突破进展，气候变化与极端天气现象的关系已经越来越容易被公众接受。

当极端天气发生时，科学家们使用模型模拟一套真实世界的气候环境，而另一套则构建了一个没有人类活动产生温室气体的气候环境。通过对两套模型的模拟测算，科学家就可以分析出气候变化对于极端天气产生几率的贡献。

2017年，一项研究指出，气候变化使得当年年飓风哈维引发的降雨因气候变化而增加了三倍，而当年2月美国冬季高温的发生几率则因气候变化而增加了三倍以上。在中国，国家气候中心针对2013年夏季我国东部的持续高温热浪事件进行了研究，分析表明，和上世纪50年代相比，人类活动引起的气候变化使得这类高温热浪事件发生概率增加了60倍。

传统的气候传播因为要面对来自科学界“气候怀疑论者”的质疑，因此格外讲究严谨，往往不会强调

气候变化对于单次极端天气事件的影响。但近年来，随着气候归因研究的迅速发展，极端天气事件正在成为气候变化传播的绝佳契机。

而很多研究都显示，高温天气的确会使人们更倾向于相信气候变化现象。在全球89个国家采集的数据显示，当气温高于当季的平均温度时，人们对气候变化的确认程度也在上升。

## 谈论气候适应的好时机

不过，在气候变化热度已经高涨之时，如何利用这一热度把气候传播做得更进一步，在气候变化紧迫性的印证之外让公众的思考更深一层，值得思考。

例如，有关适应的讨论就正在变得越来越迫切。面对愈演愈烈的极端天气事件，公众需要明白，做好准备、积极主动地去适应十分重要，因为事情已经不会回到从前。

流行病学专家指出，老年人和体力劳动者，在高温热浪来临时死亡的危险最大。此外，尽管缓慢的1度以内的平均升温被认为会增加中国粮食的种植品种和种植范围，但是短期的极端高温天气会引发伏旱，引发粮食减产。高温还会使得农作物害虫的分布范围会扩大，导致病虫害的大面积爆发。

那么，在高温天气再度来临之时，气候传播者要做的也就不仅仅是传达公众气候变化的现象本身。在个人生活方式的层面，传播者也需要提醒公众对更糟糕的天气做好应对的准备。

在社会层面，气候传播也应该避免复制气候谈判中“重减缓，轻适应”的状况，向决策者和企业等相关方传递出气候适应的紧迫性：只有积极主动地投入大量资源，为气候变化的长期适应做好准备，方能避免延误时机、支付过高的代价。

## 公众可以做什么？

除此之外，如何将高温天气炙烤出的气候变化认识，最终转化成公众实实在在的行为改变，或许是传播者们需要思考的另一个命题。

有研究表明，认识到气候变化和极端天气的关联，并不必然带来行为的改变。如果人们不相信他们的行为能够带来不同效果的话，那人们改变行为的意愿就不会那么强。

而在另外一项模型研究中，科学家们发现，公众对气候风险的接受度、采取的行动，可以使得全球在2100年的升温幅度减少1.5度之多。这些行为包括减少肉类食物的消费，选择低碳旅行方式，还有很多日常行为的选择。

这份报告的作者指出，让公众看到，自身行为、生活方式的改变的确会带来不同，会增强气候缓解工作的效果。而如何帮助更多的人在餐桌和通勤路上找到行为改变的动力，同样也是气候传播工作原本的题中之义。<sup>⑤</sup>

武毅秀，中外对话气候传播项目负责人

# Winter is coming, but how can communicators keep climate change in the news?

More than a month of high temperatures has prompted discussions about climate change, but Wu Yixiu wants to know what will happen next

□ Wu Yixiu



“The Arctic permafrost is melting, possibly releasing giant viruses! We might live to see the extinction of the polar bear!”

The long, hot summer of 2018 has been the source of

much viral content and online discussions in China over the last few months.

But the connection between sustained hot periods and climate change is often missed. Anyone who works in



climate change communications knows that the climate is a hard sell. This is understandable; the science is hard and the various negotiations are not much simpler. Getting people to notice, care and talk about climate change has always been a problem, particularly in China where climate change action comes mostly from state level.

So how can we make the most of an opportunity where hot weather turns global warming into a hot topic?

## Hotter than average discussions

Hot temperatures often make the news over the summer months, but this felt like the first year that talk about such temperatures turned into concrete concerns about global warming.

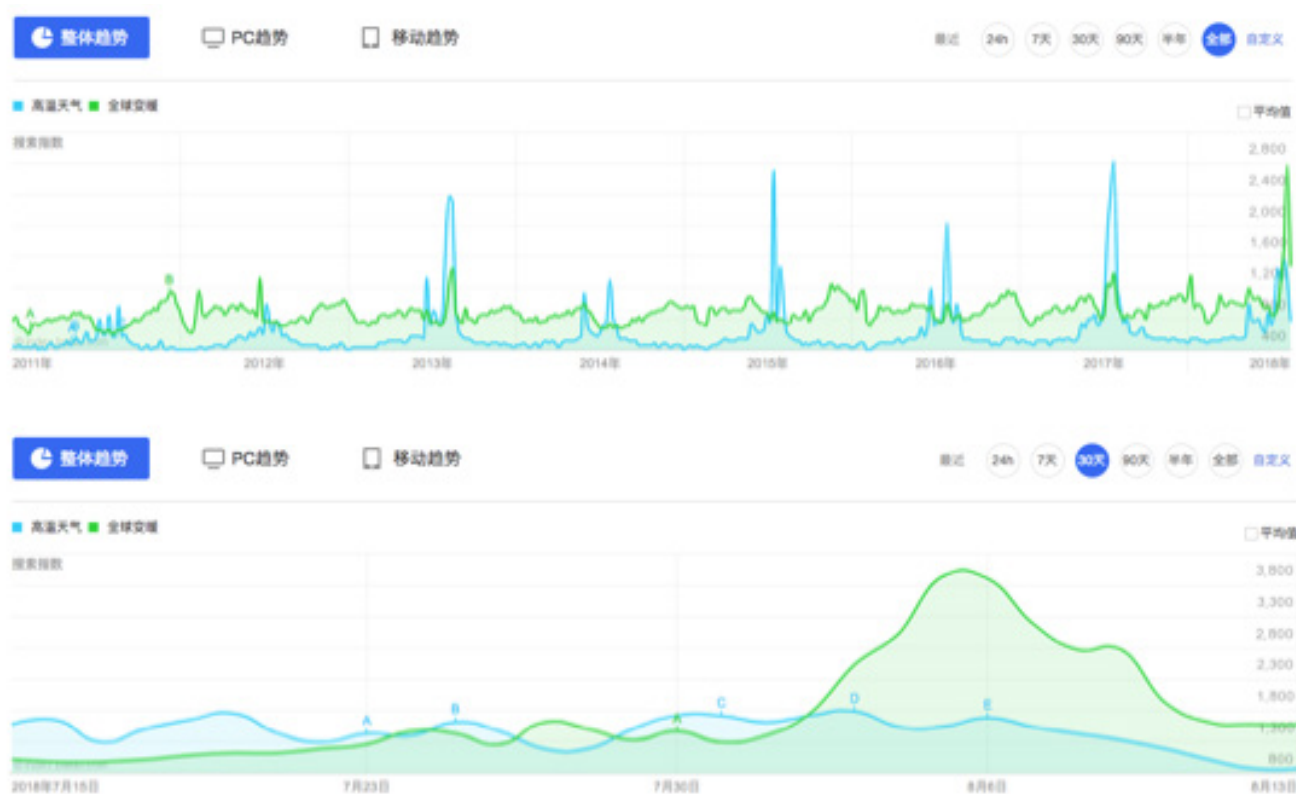
This perhaps can all be attributed to August's global heatwave. From Scandinavia to Japan, the world baked – and media outlets worldwide discussed the record temperatures in a global context. On 4 August, Chinanews.com ran

The level of Baidu searches for "global warming" exceeded the last seven summers.

an article about the heatwave in Europe and the 32 degrees Celsius temperatures being recorded above the Arctic circle. At the same time, Xinhua reported on forest fires in Greece and fish die-offs caused by the high temperatures.

China also saw longer-lasting summer heat than usual. As of August 15, the National Meteorological Centre had posted amber high temperature warnings for 33 consecutive days – meaning three or more days of temperatures topping 35 degrees Celsius. The constant heat and humidity led people to wonder if this, perhaps, is the new normal.

And internet browsing data shows the extent of people's interest. The phrase "global warming" was searched for



Graphs of search term use from Baidu. The blue line indicates searches for "hot weather", and the green line shows searches for "global warming". The top graph covers the last seven years, and the lower graph shows the last two months. Image: index.baidu.com



much more often on Baidu, China's most popular search engine, than in the previous seven summers, and even more than the phrase "hot weather".

## Extreme weather events linked to climate change

Advances in climate modelling in recent years have made it easier for the public to accept the link between extreme weather and climate change. When extreme weather occurs, scientists can use these models to simulate both the actual world, and a world where no greenhouse gases have been released by human activity. Using these two models, they can determine to what extent climate change has contributed to extreme weather events.

For example, precipitation from Hurricane Harvey in 2017 increased threefold due to climate change, while the US heat wave in February of that year was made three times more likely due to climate change. Human activity also makes events like the 2013 heatwave on China's east coast 60 times more likely than in the 1950s, according to research by China's National Climate Centre.

As traditional climate messaging faces challenges from sceptics, communicators will often avoid linking any one extreme weather event to climate change. But as research into extreme event attribution progresses, these cases are now ideal opportunities to put forth the climate message.

And there is plenty of research to show that high temperatures make people more inclined to believe in climate change. Data gathered from 89 countries shows that when


temperatures are above the seasonal average, acceptance of climate change increases.

## Time to talk adaptation

Discussions on adapting to climate change are becoming more pressing. With worsening extreme weather events, the public needs to understand the importance of preparing and adapting, and climate communicators need to work out how to convert this renewed awareness of climate change into real behaviour change.

Recognising the link between extreme weather events and climate change doesn't necessarily change behaviours, but public action on climate change – such as reducing meat consumption and choosing low-carbon transportation – could reduce temperature rises in the year 2100 by as much as 1.5C, according to one model.

So when the heatwaves strike again, climate communicators can't just talk about climate change alone; we need to get people to look at their lifestyles and remind them to prepare for even worse weather.

And at the social level, we need to avoid the focus on mitigation and emphasise the urgency of adaptation to policy-makers and businesses – only pro-active investment in long-term adaptation measures will prevent us from paying a higher price later on. 

*Wu Yixiu is team leader of Chinadialogue's Strategic Climate Communication Initiatives.*

# CFC-11 考验中国环境履约能力

因有工厂生产违禁的臭氧层破坏物质，  
国际社会正关注中国是否能够履行其国际环境承诺。

□ 冯 灏

8月5日，中国驻英国使馆发言人曾嵘罕见地致信英国《卫报》，解释中国政府为保护臭氧层所做的努力。

此前数月，中国正因一氟三氯甲烷（CFC-11）的排放量持续上升的情况而承受国际压力。如果状况得不到改善，人类数十年的臭氧层保护努力将面临严重威胁。

距地面2万-3万米的臭氧层保护着地球上的生物免受有害紫外线的辐射。上世纪70年代，科学家发现氟氯化碳物质（CFCs）会破坏地球的这一稀薄的保护层。随后，各国通过了旨在保护臭氧层的《蒙特利尔议定书》（以下简称“《议定书》”），并为氟氯化碳物质设定了淘汰时间表。

CFC-11作为一种氟氯化碳，曾作为发泡剂和制冷剂广泛使用。按照《议定书》规定，它本应于2010年1月前就退出历史舞台。但最新的研究和调查认为，来自中国的非法生产可能已使它“死灰复燃”。如何应对这一问题将考验中国履行国际环境责任的决心和绿色转型的能力。

“自2013年以来，大气中CFC-11浓度的下降速度较2002-2012年减缓了约50%，这意味着该时间段内每年有接近1.3万吨的CFC-11排放，臭氧层恢复的时间也因此将大大推迟。”

## “神秘”的排放

今年5月，一份发表于《自然》杂志的研究指出，自2013年以来，大气中CFC-11浓度的下降速度较2002-2012年减缓了约50%，这意味着该时间段内每年有接近1.3万吨的CFC-11排放，臭氧层恢复的时间也因此将被大大推迟。

而根据《议定书》，全球所有的主权国家都已承诺在2010年1月以前停止氟氯化碳的生产和使用。联

合国环境署的资料显示，全球CFC-11的生产在2006年就已接近为零。突然上升的排放量引发全球关注。

在7月11-14日于维也纳举办的《议定书》不限成员名额工作组（OEWG）第四十次会议上，该研究者 Stephen A. Montzka 报告指出，1.3万吨额外排放还是一个相对保守的估计，是相对2002-2012年十年的排放水平的增加量；而理论上，排放量应是一条下降的斜线。

《议定书》技术与经济评估委员会（TEAP）准备的一份文件指出，这些排放不太可能来源于CFC-11历史库存的泄漏。“大部分已知的存量CFC-11存在于建筑或冰箱等电器的保温泡沫中，1.3万吨排放相当于从2013年开始每年拆解掉1300万台美国式大冰箱的排放量。”

因此，未报告的新增生产被认为是CFC-11排放升高的最有可能原因，但无论是Montzka等人的研究还是TEAP的文件均未明确排放来源。

在维也纳，联合国环境署臭氧

秘书处执行秘书蒂娜·玻比利 (Tina Birmpili) 敦促各国“一秒钟也不要放松警惕。”她呼吁各方应迅速采取措施应对这一严重局面，并捍卫“《议定书》作为全世界最成功的环境公约的声誉。”

## 聚焦中国

《自然》杂志的研究发表后，有环保组织和媒体报道明确指出排放源位于中国。

英国民间环保组织环境调查署 (EIA) 于 7 月 8 日发布的调查报告指出，中国硬质聚氨酯 (PU) 泡沫行业广泛使用违禁的 CFC-11 作为其发泡剂，是该物质排放上升的主因。硬质聚氨酯泡沫是建筑保温层的常用材料。EIA 同时指出，“这些并非孤立的个案”，在行业中普遍存在。据其测算，2012-2017 年之间，中国因这些违规使用而产生的 CFC-11 排放量在每年 10307-12165 吨之间，“可以解释大部分的大气浓度上升”。

事实上，早在 2007 年 7 月，中国即已全面停止氟氯化碳的生产和进口，宣布提前两年半实现《议定书》规定的目标。

在 OEWG 期间，中国代表告诉 EIA，他们已就其调查结果进行跟进，但还无法认可其关于非法排放量的估算。

在给英国《卫报》的信中，曾嵘表示，中国执法人员按媒体报道提供的线索调查了 19 个聚氨酯泡沫生产商和产业集群，发现 1 家存在使用 CFC-11 的情况 (其中 6 家的调查还未完成)。执法人员另外还在河南和辽

宁发现了两家违法生产 CFC-11 的厂商，并已没收和查封相关原材料。

基加利制冷效率计划 (The Kigali Cooling Efficiency Program (K-CEP)) 中国顾问胡敏表示，此次事件是在中国普遍存在的环境执法能力急需加强的大背景下的个别事件，不能认为是对全球环境问题不重视。

生态环境部环保官员则回应称，中国不存在监管真空，违禁化学品的管控有日常的监测机制来保障。

在 Montzka 等人的研究发表之前的今年 1 月，中国环保部还专门发文强调严格控制消耗臭氧层物质的生产和使用。

## 产业升级之困

不管中国工厂产生的 CFC-11 是否足以解释科学家所发现的大气浓度上升，国内存在违规生产使用 CFC-11 的情况已经明确。这背后，是中国环境执法和产业升级所面临的复杂挑战。

近年来，中国对于建筑能效提出了更高要求，不仅新建筑被要求具有更好的保温隔热性能，对于老旧建筑也提出了改造要求；另一方面，城市新中产阶级的消费推高了对于冷冻冷藏供应链的需求。这些都显著扩大了泡沫保温材料的市场。

而 CFCs 的替代品又面临各种各样的问题。相关业内人士表示，新的第四代环保型 HFO 类含氟发泡剂成本高，中国国内基本仍处于研发阶段。

产品被国外跨国公司所垄断，是目前中国发泡行业面临的主要问题，“急需开发新一代具有自主知识产权的环保型发泡剂”，该业内人士表示。

北京大学环境科学与工程学院教授胡建信认为，在替代技术方面，中国替代品的研发技术水平和发达国家还存在差距，这不仅体现在替代品 (化学品) 的开发方面，同时也体现在替代品的应用技术上。

在维也纳的会议日程上，大会提出雄心勃勃的跨越式发展目标，但事实是，中国的泡沫塑料产业不仅没有向前跨越，而是退回到了已被淘汰的 CFC-11。

CFC-11 的主要替代品 HCFC-141b 对臭氧层相对更安全，但仍然还是消耗臭氧层物质和一种温室气体，也已进入《议定书》的淘汰计划中。中国近年来正在逐步削减 HCFC-141b 在聚氨酯泡沫行业的使用量。该行业只有采用更为环保的技术才能跟上国际规则的变化。

一些生产厂商告诉《纽约时报》，由于 HCFC-141b 的供应量减少、价格上升，他们只好回去使用地下黑工厂生产的 CFC-11。

但胡建信认为，替代技术的落后不应成为企业生产和使用违禁品的理由。

他同时提醒，由于四氯化碳是生产 CFC-11 所必须的原料，因此应对其重点监管。更为重要的是，加强针对这类物质的大气监测以及开展履约成效评估，是及早防范额外排放来源的有效措施。

今年 11 月，厄瓜多尔将举办《议定书》缔约方大会。届时，各国将讨论针对 CFC-11 违规排放问题的具体措施和行动。

冯灏，中外对话研究员

# Ozone-depleting substances test China's commitment to global treaty

Illegal production of banned CFCs raises doubts over whether China can keep its environmental promises

□ Feng Hao



*Barrels of chemicals in a local factory in China containing CFC-11*

China has been under international pressure in recent months following the discovery that several companies may be responsible for sustained increases in the release

of CFC-11, an ozone-depleting substance that countries agreed to phase-out under the Montreal Protocol by 2010.



In an unusual move, Zeng Rong, a spokesperson for the Chinese embassy in London wrote to the Guardian newspaper on August 5 to explain just how seriously the Chinese government takes its responsibility to the international treaty. China is determined to identify and stop any illegal CFC-11 production, he said.

Investigations, so far, show that some Chinese companies chose to use banned CFC-11 in their manufacturing processes rather than adopt more expensive but less harmful alternatives. The discovery highlights the complex challenges facing the country's environmental law enforcement, and efforts to upgrade manufacturing industries.

## Delayed recovery

The ozone layer lies between 20 and 30 kilometres above the surface of the Earth and blocks harmful ultraviolet radiation. In the 1970s scientists realised that chlorofluorocarbons (CFCs), which were once widely used as a refrigerant and blowing agent for foams, were reacting with ozone in the atmosphere and damaging the thin protective shield.

To halt the damage and allow the layer to gradually recover, countries negotiated the Montreal Protocol, which set a timeline for ending the production and use of CFCs by January 2010.

Data from the United Nations Environment Programme shows that production of CFC-11 fell to almost zero by 2006. China announced that the manufacture and import of CFCs ended in July 2007 – two and a half years ahead of the Protocol timetable.

However, research published by Nature in May this year found that the reduction in atmospheric CFC-11 from 2013 onwards was 50% slower than in the previous decade. This

meant almost 13,000 tonnes ( $\pm 5,000$  tonnes) of CFC-11 had been released, delaying the decades-long global effort to restore the stratospheric ozone layer.

## Ruling out historical stocks

So, how to explain the sudden rise in CFC-11 emissions?

A document prepared by the Montreal Protocol's Technology and Economic Assessment Panel (TEAP) dismissed the possibility that the emissions were leaks from products and materials made with CFC-11.

In a statement it wrote: "Most of the known bank of CFC-11 is projected to be in insulating foams, particularly closed-cell polyurethane that was used in cladding panels for buildings and appliances like refrigerators."

It added that the release of 13,000 tonnes of CFC-11 would be like disposing of 13 million large-sized refrigerators every year from 2013.

It is, therefore, unlikely that historical stocks are to blame for the rise in emissions. TEAP concluded that new and unreported manufacturing of CFC-11 is the most likely explanation but did not conclude who was responsible.

Tina Birmpili, executive secretary of UNEP's Ozone Secretariat, called on countries to not "relax their vigilance for a second", and for urgent measures to be taken to deal with the problem and to protect "the hard-earned reputation of the Montreal Protocol as the most successful environmental treaty".

## Is China responsible?

After publication of the research in Nature both environmental groups and media outlets stated that China was the source of the emissions.

The Environmental Investigation Agency, a UK-based non-profit, published a report on July 8 that blamed China's rigid polyurethane foam industry for using banned CFC-11 as a blowing agent. This type of foam is commonly used as an insulator in the construction sector. The EIA said that evidence of CFC-11 was being used in China "cannot be treated as a series of isolated incidents".

**The release of 13,000 tonnes of CFC-11 would be like disposing of 13 million large-sized refrigerators every year from 2013.**

“It is clear that illegal production has taken place in China.”

The EIA estimated that Chinese companies produced 10,307 to 12,165 tonnes of CFC-11 annually between 2012 and 2017. It also claimed that “emission estimates associated with the level of use reported by these companies can explain the majority of emissions identified in the atmospheric study”.

During the meeting of the OEWG, China’s representatives told the EIA that it was following up on the investigation’s findings but could not confirm the calculations.

In a letter to the Guardian, Chinese embassy spokesperson Zeng Rong said that Chinese law-enforcement officials had investigated 19 polyurethane manufacturers and one business cluster. One firm was found to be using CFC-11 and six investigations were ongoing. Two illegal manufacturers of CFC-11 had been identified in Henan and Liaoning provinces, in central and northeast China, respectively, with CFCs and raw materials confiscated.

Are China’s regulatory and monitoring systems ineffective? Officials from the Ministry of Ecology and Environment have denied there is a regulatory vacuum, pointing out that monitoring systems are in place to ensure control of banned chemicals. Also, in January, before the research was published in Nature, the MEE published a document emphasising strict controls on the manufacture and use of ozone-depleting substances.

Hu Min, China consultant to the Kigali Cooling Efficiency Program, said that production was a one-off incident to be considered in the context of China’s urgent need for tougher environmental law enforcement – it is not the case that China does not take global environmental issues seriously.

## The struggle to raise standards

Whether or not Chinese production of CFC-11 fully explains the rise in emissions, it is clear that illegal production has

taken place in China. This highlights the challenge faced by companies tasked with upgrading their production processes, and by environmental law enforcement bodies in monitoring their activities.

In recent years China’s demand for foam insulation has increased because of tougher energy efficiency regulations for new and existing buildings, and demand for cold supply chains from China’s more affluent urban middle class.

But one industry insider says alternatives to CFCs, such as new environmentally-friendly hydrofluoroolefins (HFOs), are expensive. China is still developing these chemicals and foreign multinationals have a monopoly on the supply. This is a major problem for China’s foaming agent industry, which “urgently needs to develop a proprietary environmentally-friendly foaming agent,” said the insider.

The main alternative to CFC-11 that’s currently in use is HCFC-141b. This is less damaging to the ozone layer but is still an ozone-depleting greenhouse gas. It’s listed for phase-out by the Montreal Protocol.

China has been gradually reducing the quantity of the substance used in polyurethane foam manufacturing, but the sector will have to adopt greener technology if it is to keep up with international rules.

Some manufacturers told the New York Times that limited supplies and rising prices for HCFC-141b had driven them to use CFC-11 produced by illegal manufacturers.

Hu Jianxin, a professor at Peking University’s College of Environmental Sciences and Engineering, said that failure to develop and adopt alternatives to CFCs should not be an excuse for companies to manufacture and use banned chemicals.

He added that the government should focus on controlling carbon tetrachloride, which is an essential feedstock for CFC-11. The professor also wants to see closer monitoring of the substance in the atmosphere, and assessments of China’s success in implementing the Protocol.

A meeting of signatories to the Montreal Protocol will be held in Ecuador this November. Specific measures to be taken in response to the illegal emissions of CFC-11 will be discussed then. ☞

*Feng Hao is a researcher at chinadialogue.*

# 应急管理部成立： 中国灾害应对进入新格局？

新成立的应急管理部吸纳了十三个部委的减灾专业官员，减灾事业迎来变革。

□ 曹越



汶川特大地震纪念馆

**今**年4月，中华人民共和国应急管理部挂牌成立，这是今年3月全国人民代表大会通过的国务院大规模机构改革方案的一部分。

自2003年“非典”疫情爆发后，政府为改善中国灾害应急管理能力做出了一系列努力，这次备受期待的改革

是最新的一次尝试。新部门不仅将为解决国家机构内部现存问题发挥重要作用，还有望提高国家应对灾害及灾后重建的能力，减少生命和财产的损失。

但这也是中国加强减轻灾害风险（DRR）工作的一个契机。DRR是指识别、评估和减少灾害诱因的一套

系统化的方法，人员、基础设施和经济受人为和自然灾害影响的风险大小和脆弱程度都在其关注之列。有证据表明，DRR是控制灾害造成的死亡和损失的一个颇具成本效益的方法，相比侧重灾后应急响应和恢复的方法而言，DRR的成本更低。



而问题是，政府是否能利用好这次机会？

## 中国的减灾方针

中国了解 DRR 的好处，并一直致力于加强这方面的工作。例如，2008 年汶川大地震发生后，政府曾下大力气，通过落实新的建筑规范，在学校开展大量应急演练，加强地震预警系统等措施。

尽管官方从宣传和政策上都提倡以“预防为主”的方式，但减灾工作一直落后于灾害响应和灾后重建。其中一些原因包括地方和国家缺少资金开展减轻灾害风险的工作，缺少一体化的风险信息存储和共享系统；此外，与灾害管理相比，民间社会对减轻灾害风险（CRR）的认识和协调程度较低。

政府已经意识到了这个问题。就在 2016 年 12 月，党和政府联合发布了体制机制改革文件，指出亟须改善当前体制中存在的重救灾轻减灾的问题。

## 减灾工作面临体制阻力

中国不注重减轻灾害风险（DRR）主要是因为各部门权责不清，且在灾难管理上常常相互竞争。这两个长期存在、且相互关联的问题阻碍了灾害响应工作，从而促成了新部门的成立。

中国每个政府部门分管着具体的经济部门或问题，其中也包括与该部门相关的自然和人为灾害的管理。这种僵硬的职责分工在实践中并非全然有效。例如，蔓延到附近森林的草原火灾由林业管理部和农业

部两个部门进行管理，同样也需要两个不同的消防单位介入。

在各部委权责出现交叉的时候，这种责任的划分也产生了灰色地带。这样一来会产生很多问题，因为大多数灾害并不能清晰地划入预先确定的类别，而且灾害的影响往往也是广泛而深远的。例如，2008 年中国南方遭遇罕见雨雪冰冻灾害，导致一系列相互关联的基础设施无法正常运转；一些发电站崩溃，从而导致铁路关闭，并进而使得煤炭无法运往发电站。

此外，热衷于扩大权力范围的部委经常利用模糊的治理界限参与竞争。这些问题加在一起，导致了信息共享不足、统筹协调困难，投资冗余和资源浪费等问题，阻碍了有效的救灾减灾进程。

## 新部门的职责

鉴于这些问题，新的“大部门”将接管之前分散在 13 个部门的灾害管理权力和资源，成为负责应急响应的唯一机构。

关于减灾，新部门有权“处理 / 明晰防灾和救灾的关系”，并“指导火灾、水旱灾害、地质灾害等防治”。

事实上，除了吸收现有国家减灾委员会（NCDR）之外，该部门已经从各个部门接管了相应的减灾责任。由于缺少实权，国家减灾委员会此前只是名义上领导着各部门的减灾工作。

这项任务并非小事，仅靠机构重组还不足以给中国带来体制上的根本性变革。不过，有几个因素表明新部门还是有机会实现中国的减灾目标的。

首先，该部门可以综合考虑灾害风险间的相互影响，并从长远角度分析这些风险。这对于减灾至关

重要，因为这些风险跨部门、学科和系统，而且中国对这些风险的感受也与日俱增。

其次，新部门的人员来自被吸纳的十三个部门。这些人将从不同的领域为新部门带来丰富的经验、观点和人脉，但更重要的是，他们可以充当新部门与之前部门间的有效桥梁。这一点至关重要，因为降低风险必须用到非结构性措施（例如土地使用规划、分区、建筑法规、税收优惠、教育、培训），而非结构性措施仍然属于之前那些部委的权利范围。

最后，新部门将拥有推广和实施减轻灾害风险（DRR）工作的行政权力，因为它吸收了四个部委间协调委员会的权力（国务院抗震救灾指挥部、国家防汛抗旱总指挥部、国家森林防火指挥部、国家减灾委员会）。此前，减轻灾害风险和应急响应协调工作是由这些委员会负责的。

对于负责落实政策的下级政府部门而言，这么做尤其有效。由于部委间委员会的行政级别高于各部门的地方分支机构，因此以部委间协调委员会的名义发布或落实灾害政策更加有效。

目前尚不清楚应急管理部将如何发挥作用。这在很大程度上取决于其内部体制结构及流程、与省和地方政府的关系、在国务院内地位和话语权的高低，以及为其提供技术和研究支持的下属公共服务单位。

尽管存在这些不确定因素，但新部门仍带来了新的希望，希望下一次灾难发生时，中国将做好更充分的准备。现在我们拭目以待，看看这些希望能否实现。☺

曹越，英国智库海外发展研究所(ODI)高级研究员



# A turning point in China's disaster preparedness?

The new Ministry of Emergency Management could help to save more lives and lower costs from disasters

□ Cao Yue



© Stuart Isett / Fortune Global Forum

*Lessons from the past: Wenchuan earthquake memorial museum*

In April, the Chinese government inaugurated the new Ministry of Emergency Management as part of the massive government overhaul announced at the National People's Congress in March.

This long-awaited reform is the latest in a series of efforts going back to the SARS epidemic in 2003 to improve how

China manages and responds to disasters. The new ministry will play an important role in solving existing problems within the state architecture. It is expected to improve the state's ability to save lives and reduce economic losses during and after disasters.

But it's also an opportunity for China to improve its

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The new “super ministry” will take on disaster management powers and resources that were previously spread over 13 other ministerial departments.

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disaster risk reduction (DRR), a systematic approach to identifying, assessing and reducing the causal factors of disasters, namely the exposure and vulnerability of people, infrastructure and economies to manmade and natural hazards.

There is evidence that DRR is a cost-effective way to limit fatalities and damage from disasters, and that it's less expensive than focusing on response and recovery after disasters have happened.

The question is, will the government make use of this opportunity?

## China's approach to disaster risk reduction

China understands the benefits of DRR and is committed to it. After the 2008 Wenchuan (or Sichuan) earthquake, for example, the government made considerable efforts to reduce disaster risk by enforcing new building codes, introducing extensive emergency drills in schools, and strengthening earthquake early warning systems.

Yet the mitigation sector has lagged behind the response and recovery sectors, despite official rhetoric and policies promoting a “mitigation first” approach. Some of the reasons include inadequate funding for DRR at both the local and national level, lack of an integrated system for storing and sharing risk-related information, and lower awareness of and coordination on DRR among civil society compared to disaster management.

The government has acknowledged the problem. As recently as December 2016, the Party and the government jointly issued a system reform document, which pointed to the excessive focus on rescue compared with prevention, as one of the main problems of the system in need of improvement.

## Obstacles to effective disaster risk reduction

China's inattention to DRR is largely a result of two long-standing and interconnected issues: ministries are uncertain over exactly where responsibilities sit, and they often compete to address disasters. These issues, which have hindered disaster response efforts, prompted the creation of the new ministry.

Each Chinese ministry has control over a specific economic sector or issue, including the response to natural and manmade hazards associated with that sector. This rigid division of duties doesn't always work well in practice. For example, a grassland fire that spreads to a nearby forest is administratively managed by two ministries – the forestry administration and the agriculture ministry – potentially requiring the intervention of two different fire units.

It also creates grey areas of responsibility where ministries' mandates intersect. This is problematic because most disasters don't fit neatly into pre-determined categories and often have widespread and far-reaching consequences. For example, an ice storm that struck southern China in 2008 triggered a series of interlinking infrastructure failures, causing power stations to fail, which led to the closure of railways that in turn prevented delivery of coal to the power stations.

Moreover, ministries that are keen to expand their mandates often used the blurred governance boundaries to engage in rivalry. Together these issues have often resulted in poor information sharing, coordination bottlenecks, redundant investments, and wasted resources, hindering effective disaster risk reduction and disaster response.

## The new ministry's role

In recognition of these issues, the new “super ministry” will take on disaster management powers and resources that were previously spread over 13 other ministerial departments, thus becoming the sole agency in charge of emergency response.

As for mitigation, the new ministry has powers to “handle and or clarify the relationship between mitigation and response,” and “lead the mitigation of fires, floods, droughts, geological and other hazards”.

In fact, it has taken over mitigation responsibilities for these hazards from their respective ex-ministries, in addition to absorbing the existing National Committee for Disaster Reduction (NCDR), which so far has only nominally headed the mitigation work of the many agencies because it has lacked the actual authority to do so.

This is no small task. Mandates by themselves are rarely enough to bring about change within the Chinese system. However, several factors suggest that the new ministry has a chance of meeting the country's risk reduction aims.

Firstly, the ministry will be able to consider the interdependent risks of disasters and do so with a long-term view. This is fundamental to mitigate disaster risks because they cut across sectors, disciplines and systems, and their impacts are increasingly being felt in China.

Secondly, the new ministry will be staffed with personnel from the thirteen ministerial departments that have been dissolved. These people will bring a wealth of different experiences, perspectives and contacts, but more importantly they can play an effective bridging

function with their previous ministries. This will be vital because mitigating risks requires the use of non-structural measures (e.g. land use planning, zoning, building codes, tax incentives, education, training), which are still the prerogative of those ministries.

Finally, the ministry will have the administrative power to foster and implement DRR from the start because it has absorbed the powers of the four inter-ministerial coordination committees (for earthquakes, floods and droughts, forest fires, and NCDR). These were previously tasked with DRR and emergency response coordination duties.

This will be particularly useful at lower levels of government where policies are implemented. The inter-ministerial committees have a higher administrative rank than the individual local ministry branches so disaster policies are often nominally issued or implemented through them to increase their effectiveness.

It's still unknown how the Ministry of Emergency Management will turn out. A lot depends on its internal structures and processes, its relationship with provincial and prefectural governments, its unofficial ranking within the State Council, and the affiliated public service units providing technical and research capacity.

Despite these uncertainties, the new ministry offers hope that when the next disaster hits, China will be better prepared. Now it's a case of watching and waiting to see if these hopes are realised. ☞

*Cao Yue is a senior research officer at China's Overseas Development Institute (ODI)*



# #MeToo之后： 改善中国环保界性别平等现状

反性骚扰只是起点，在中国环保组织工作的女性需要追求更大的话语权和影响力。

□ 姚 喆



反对性骚扰环保公益领域也不例外

**#Me**Too运动近期相继在中国的学术界、公益界和媒体界爆发，用残酷的事实展示了工作场合性骚扰、性侵犯的普遍性。人们批判施暴者漠视道德准则和他人尊严，呼吁尽早建立预防和惩

罚性骚扰的有效机制。

被曝光的性侵行为往往发生于掌握权力的男性和处于弱势的女性之间（如男记者与女实习生、男性机构负责人与女志愿者），凸显出职场乃至整个社会中存在着基于权力不

平等的侵害行为，环保公益领域也不例外。因此，反对性骚扰只是一个开始。女性的诉求不应止步于获得保护，她们需要更主动地、更全面地参与到追求性别平等、重塑权力结构的进程中。



如果参与讨论的总是固定的一群人且男性居多，最终推出的政策很可能无法有效反映女性的利益诉求，从而又进一步强化了男性主导的局面。而事实上女性往往更易受环境污染和气候变化影响，

## 环境领域的性别不平等

性骚扰事件可谓是性别不平等的极端体现，其实职场中还存在许多看似更“温和”的问题。环境领域的工作者对这些现象一定不觉得陌生：大大小小的会议上，在台上侃侃而谈的多是男士，虽然研究相同议题的女性并不罕见（国际上，这被形象的称为 manel，既 all-male panel）；环境新闻报道中更多引用的是男性专家的观点和意见；在很多环保机构中，尽管总体上女性员工更多，但管理层还是以男性为主。

这一类的问题不以暴力的形式出现，但却会系统性的限制女性职业发展、固化男性主导的权力结构。很多人觉得上述现象司空见惯，其实也是默许了性别不平等的事实。

环保组织的工作往往希望对外界产生影响。因而，内在的性别权力失衡会随着工作的开展产生外部影响。比如，政策制定本应吸收多方意见，如果参与讨论的总是固定的一群人且男性居多，最终推出的政策很可能无法有效反映女性的利益诉求，从而又进一步强化了男性主导的局面。而事实上，女性往往更易受环境污染和气候变化影响，她们的诉求本该成为政策和项目设计的重点。虽然女性也完全可以成为男权、父权的维护者，但增加女性发声机

会和女性领导者的数量仍不失为弥补两性权力差距的良方。

## 现在就可以开始改变

丑闻曝光之后，众多国内公益机构就公开做出了反性骚扰承诺，这样的快速回应也给人以希望。毕竟，比起受体制严格束缚的政届、商界和学术界，NGO 行业更具备发生变革的基础和潜力。

提高女性话语权和影响力是一个复杂、缓慢的过程，但已经有人开始采取一些切实可行的行动。比如，让女性专家的观点和声音更多的出现在媒体报道中。例如，NüVoices 团队就搜集整理了一份研究中国问题的女性专家名单，包含专家们的专业领域和联系方式。这份名单免费供其他记者使用，以鼓励同行将更多女性声音纳入报道。不过，这份名单上中国籍的女性专家仍是少数，可以做进一步的扩充。针对中文媒体工作者，类似的名单和倡议也值得推广。

再比如，在各类会议上为女性参与者提供更多的发言机会，杜绝“全男性论坛”（manel）现象。在环境领域工作的女性众多，只要能将性别平等作为组织会议的一项基本原则，这一点应该不难实现。在具体操作上，欧洲同仁的做法可资借鉴：

旨在提高欧盟政策讨论中性别多样性的倡议 The Brussels Binder 已经编写了一份指南，不管你是会议组织方还是参会嘉宾，你都可以在指南里了解到如何以自身的行动提高会议中的性别平等。

## 更大胆一些…

爱尔兰前总统 Mary Robinson 和爱尔兰喜剧演员 Maeve Higgins 于近期启动的一个新项目提出了比单纯的“平权”更具雄心的想法。这个名为“创造之母”（Mothers of Invention）的倡议计划通过播客的形式，讲述全球各地女性应对气候变化的行动。她们认为气候变化问题有其更深刻的根源：“父权资本主义制度将不会解决气候变化问题，而我们需要去。”

性别平等并不是要在现有体制下与男性“争权”，而是要彻底改变父权制的格局，建立一套女性主义的治理和行为模式。具体到环境议题上，就像 Mary Robinson 所说：“由人类活动引发的气候变化需要女性主义的解决方案”。这个思路也适用于中国所面对的众多环境挑战。<sup>⑤</sup>

姚喆，中外对话气候战略传播项目官员

# #MeToo has arrived and China's environmental sector must respond

Fighting sexual harassment is just the start:  
women working for China's environmental groups need to be heard

□ Yao Zhe

The #MeToo movement has reached China's universities, charities and media following a number of allegations against well-known men, and it's revealing important truths about the frequency of sexual harassment and assault in the workplace. The alleged perpetrators have been criticised for lacking moral standards and respect for others, resulting in calls to put in place systems to help prevent and punish such behaviours as soon as possible.

The cases of sexual harassment and assault exposed recently have mostly occurred between powerful men and less powerful women (for example a male reporter and a female intern, and a male charity founder and a female volunteer). This reminds us that harassment in the workplace, and in society as a whole, relies on power imbalances – and that the environmental sector is no

exception. Therefore, fighting sexual harassment is just one part of the solution: women should not just demand protection, but take an active approach to calling for gender equality and the rebuilding of power structures that govern our workplaces.

## Sexual inequality in the environmental sector

Sexual harassment can be viewed as an extreme manifestation of gender inequality, but there are more “moderate” examples that exist in the workplace. Those who work in the environmental and climate sphere in China will not be surprised to see conferences large and small feature mostly male speakers, even if there is no lack of female researchers on the topic under discussion (internationally, an all-male panel is referred to as a “manel”). Environmental news stories quote male experts much more often than their female counterparts. And while environmental groups have more female employees than men, management is usually male, based on my observations.

These are not questions of violence, but they do

“  
There are many women working  
in the environmental sector.  
”

“It is women who are more likely to be affected by pollution and climate change.”

systematically hamper women's professional development and reinforce male-dominated power structures. That many people believe the above phenomena are nothing unusual is a tacit admission of the reality of gender inequality.

Environmental groups often want to create change but the gender imbalances within those groups disrupt or limit the change they seek to make. For example, policymakers should listen to a wide range of opinions but if it is always the same group of men participating in those discussions, the policy created is much less likely to reflect wider interests, thus further privileging male interests.

In fact, it is women who are more likely to be affected by pollution and climate change, and so their needs should be the focus of policy and project design. Women can just as easily be protectors of male authority and patriarchy, but increasing the opportunities for women's voices to be heard and raising the number of women in leadership roles will help redress some of these imbalances.

## Change can start now

Since the scandals broke many Chinese civil society bodies have made commitments to fight sexual harassment. The speed of the response is cause for hope. Government, business and academia are more constrained by their systems, but the NGO sector has a strong tradition of dynamism and bringing about change.

Increasing women's voices and influence in China will be a long and complex process but real action has started. For example, getting more female experts into the media. The group NüVoices has put together a list of female experts

researching Chinese issues, the areas they study, and contact details. This is offered for free to other journalists to encourage their colleagues to include more female voices in their reports. However, experts of Chinese nationality are still in the minority on this list, and more could be added. It would be valuable to provide a similar list to journalists working in Chinese.

It is also possible to give more women opportunities to speak at conferences and prevent the appearance of “manels”. There are many women working in the environmental sector, so this should be easy to do. A European approach could be copied: to increase gender diversity in EU policy discussions the Brussels Binder created guidelines. Whether you're the keynote speaker or the organiser it contains information on how to boost gender equality.

## Be braver

Former president of Ireland Mary Robinson and Irish comedian Maeve Higgins have recently launched a project with ambitions beyond simple “equality”. Their Mothers of Invention initiative uses a podcast to discuss what women around the world are doing to combat climate change. For them, there is a deeper problem to climate change: “The capitalist patriarchy is not going to solve this. We need to”.

Gender equality isn't about seizing power from men within the existing system, but changing patriarchy itself and creating a feminist model of governance and behaviour. When it comes to the environment, as Mary Robinson says: “climate change is a manmade problem that requires a feminist solution.” This view is also applicable to the various environmental challenges China faces. ☞

*Yao Zhe is a strategic climate communications officer at chinadialogue.*

# 金砖银行和亚投行： 新玩家，老游戏

深陷失业和污染双重困境中的波黑，  
究竟该如何权衡来自中国的煤电建设贷款的利弊？

□ 罗伯特·苏塔

**自** 2013 年中国启动了旨在加强国家间互联互通的“一带一路”倡议以来，从巴基斯坦到巴拿马，发展中国家纷纷表达了对该倡议的支持。

这一趋势仍在继续。习近平主席刚刚对非洲进行了访问，并随后参加了 7 月 25 至 27 日在约翰内斯堡举行的由南非主办的第十届金砖国家（巴西、俄罗斯、印度、中国和南非）峰会。在习主席访非期间，塞内加尔和卢旺达也签署协议，加入了“一带一路”大家庭。

“我期待与金砖国家领导人合作……抓住发展机遇。”习近平在峰会上表示。

提供融资以填补长期以来基础设施建设的资金缺口是一个诱人的承诺，因而支持“一带一路”倡议对发展中国家而言是一桩“不错的

买卖”。但中国主导的金融机构为新项目提供的资金是否能够真正将引导各国走上可持续的发展道路呢？

中国主要是通过国家开发银行和中国进出口银行为开发项目提供融资的，这两家银行已经因为缺乏透明度和支持高污染能源而倍受诟病。

同样肩负海外基础设施融资任务的还有两家中国主导的新的多边银行——亚洲基础设施投资银行（亚投行）和新开发银行（金砖国家新开发银行，又名金砖银行）——但两者的融资规模要小很多。

## 缺乏想象力

这两家成立时间均不满 5 年的新银行有望能够在透明度和可持续性问题上乘承高于中国国家开发银行的标准，可担忧依然存在。

“金砖银行和亚投行似乎对 21 世纪可持续发展的形态缺乏想象力和抱负。”美国环保组织“地球之友”（Friends of the Earth US）资深可持续发展财务经理凯瑟琳·卢说。

卢还说，这两家银行尽管在创造更好的可持续发展模式方面具有“深厚潜力”，但未能从西方主导的金融机构的社会和环境政策中获得启迪，且已经落后于同行的标准。

尽管行长卡马特坚称金砖银行支持可持续发展，但他并未排除投资煤炭等高碳排放能源项目的可能性。

鉴于美国总统唐纳德·特朗普引发了中美两国之间的关税大战，全球贸易很可能成为此次金砖国家峰会的首要议题，但在非洲举行峰会为解决这片大陆的基础设施需求提供了机会。

亚投行最近与非洲开发银行签



署了一份谅解备忘录，双方将展开合作，推动经济的可持续发展。与此同时，金砖银行于近期批准了6亿美元的新项目贷款，称这些项目将减少温室气体排放。

其中3亿美元将用于支持河南省洛阳市新地铁线路的建设，以“疏解交通压力”。其余的3亿美元贷款则通过南非开发银行（DBSA），用于支持“能源部门的可持续发展项目”，目的是“改善南非的能源结构和提高能源效率”。

根据其协议条款，金砖银行的任务是为金砖国家和其他“新兴国家”的基础设施建设调集资源。到目前为止，金砖银行的投资项目组合已经价值近60亿美元，并在南非投资了3个项目。目前，金砖银行的贷款国家尚不包括非金砖国家。

伦敦政治经济学院国际关系中心（Global South Unit）副主任克里斯·奥尔登认为，新项目必须考虑潜在的环境损害。他希望看到金砖国家承诺将定期的环境评估纳入金砖银行支持项目的可行性研究中。

“向世界其他地区展现他们的领导力尤为重要，因为金砖国家已经表示对绿色能源项目的支持。”他说。

从2016年金砖银行为小规模可再生能源项目提供的首批贷款就可

“  
由于金砖银行和亚投行  
未能全面记录其项目的  
温室气体排放量，所以  
无法采取大胆行动抗击  
气候变化。”

以看出金砖银行对“清洁”项目的支持。此后，金砖银行还为成员国的一些项目提供了融资，其中大多数为风电和水电项目。

但卢认为，金砖银行仍缺乏强有力的内部政策来保证对可持续项目的持续支持。例如，该行尚未建立针对项目影响的有效问责制度。而在其他多边银行，受项目不利影响的人们可以通过相关渠道表达他们的担忧，或举报银行未能遵守其政策的行为。

## 可持续发展目标

习近平在约翰内斯堡举行的一场商界领袖会议上呼吁金砖国家将联合国的可持续发展目标（SDGs）纳入本国的国家发展战略。

根据《可持续性（Sustainability）》

杂志最近发表的研究，私营部门在落实可持续发展目标的过程中发挥着重要作用，而在金砖国家中，中国企业目前处于领先地位。

“中国率先确立了可持续发展目标。”研究发现。该研究考察了每个金砖成员国的5家跨国公司，分析了这些公司的愿景和任务及其与可持续发展目标的兼容性。

但和印度企业的情况一样，中国企业的政策主要侧重的是目标9：产业、创新和基础设施，而与环境有关的问题则往往会被忽视。

研究称，金砖国家的大多数企业对气候行动（目标13）和水下生物的保护（目标14）都重视不够，金砖国家峰会也没能更好地协调实现这些目标。

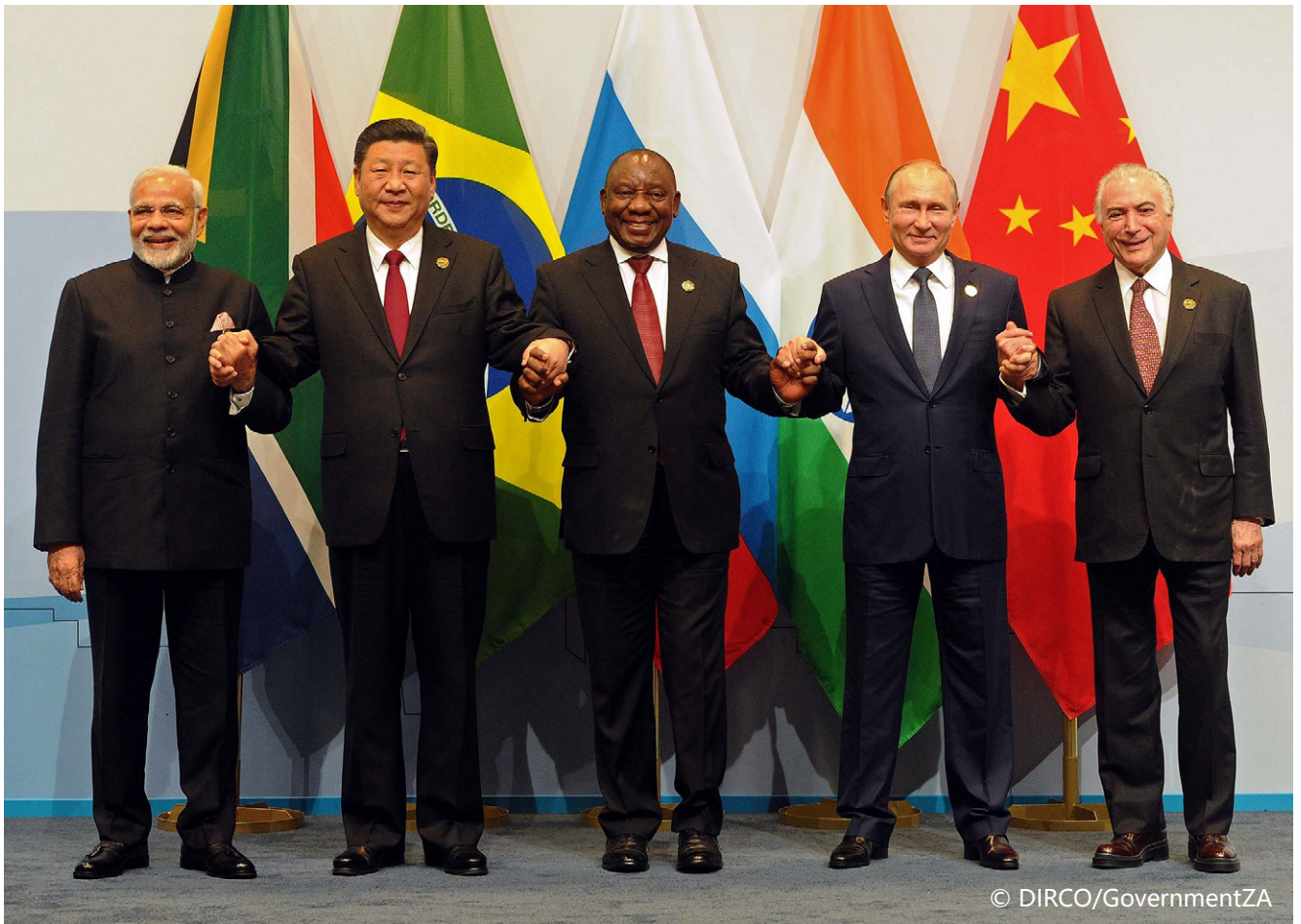
卢说，由于金砖银行和亚投行未能全面记录其项目的温室气体排放量，所以无法采取大胆行动抗击气候变化。她认为这阻碍了两家银行履行承诺，支持可持续发展的能力：“亚投行和金砖银行虽然是新玩家，（但）玩儿法一点儿没变。”

罗伯特·苏塔，中拉对话执行编辑，常驻英国伦敦

# BRICS Bank and AIIB: New players, same old game

Infrastructure finance is on the agenda at the BRICS Summit

□ Robert Soutar



*Leaders' group photo on the sideline of the 10th BRICS Summit in Johannesburg*

From Pakistan to Panama, a steady stream of countries from the Global South have endorsed China's Belt and Road Initiative (BRI) promoting connectivity since its launch in 2013.

The trend continued this week as Senegal and Rwanda inked deals under the BRI banner during President Xi Jinping's tour of the African continent ahead of the 10th summit of the BRICS group – Brazil, Russia, India, China

and South Africa – hosted by the latter in Johannesburg from July 25-27.

“I look forward to working with the leaders of the BRICS countries to... seize the opportunities for development,” Xi told the summit.

The BRI makes enticing promises of finance to bridge longstanding infrastructure gaps. It has been labelled an “easy sell” to developing countries seeking investment. Yet there are few guarantees that finance issued by Chinese-led institutions for new projects will steer countries towards a path of sustainable development.

China finances development projects mostly through the China Development Bank and the Export Import Bank of China, which have been criticised for their lack of transparency and support for mostly “dirty” energy.

Two new China-led multilateral banks are also tasked with supplying finance for infrastructure overseas – the Asian Infrastructure Investment Bank (AIIB) and the New Development Bank (NDB, or BRICS Bank) – albeit on a much smaller scale.

## Lack of imagination

Both less than five years old, these two new lenders raised hopes that they would adhere to higher standards on transparency and sustainability than China’s national development banks. But concerns remain.

“The NDB and AIIB seem to have suffered from a lack of imagination and ambition on what sustainability can look like in the 21st century,” said Katharine Lu, senior sustainable finance manager at Friends of the Earth US.

Lu added that despite their “profound potential” to create better models of sustainable development, these new lenders have failed to take inspiration from Western dominated

financial institutions’ social and environmental policies and have fallen short of the standards of their peers.

Despite insisting that the NDB supports sustainability, Kundapur Vaman Kamath, the bank’s president has failed to rule out investing in high carbon-emitting energy sources, such as coal.

Global trade dominated the BRICS summit agenda given the reciprocal tariffs imposed by the US and China, initiated by President Donald Trump. The summit in Africa also presented an opportunity to address the continent’s need for infrastructure.

The AIIB recently signed a memorandum of understanding with the African Development Bank to cooperate on sustainable economic development. Meanwhile, the NDB earlier this week approved US\$600 million for new projects it says will reduce greenhouse gas emissions.

US\$300 million will support the construction of a new line of the Luoyang Metro in central China’s Henan province to “reduce heavy traffic”. The remaining US\$300 million will go via the Development Bank of Southern Africa (DBSA) for “sustainable development projects within the energy sector”, with the aim of “improving the energy mix and energy efficiency of the economy”.

The NDB is mandated to mobilise resources for infrastructure for BRICS members and other “emerging nations”, according to its articles of agreement. So far the NDB has a portfolio worth almost US\$6 billion and has three projects in South Africa. It is yet to extend a loan to a non-BRICS member country.

It is crucial that new projects take account of potential environmental damage, according to Chris Alden, co-director of the Global South Unit at the London School of Economics. He would like to see BRICS countries commit to incorporating regular environmental assessments into feasibility studies for NDB-backed projects.

China finances development projects criticised for their lack of transparency and support for mostly “dirty” energy.

“It is especially important for BRICS countries to signal their leadership to the rest of the world, as they have indicated their support for green energy projects,” he said.

A first batch of loans issued in 2016 for small-scale renewable energy projects hinted at the New Development Bank’s support of “clean” projects. A number of mostly wind and hydropower projects in member countries have followed.

But for Lu the NDB still lacks strong internal policies that can guarantee ongoing support for sustainable projects. For example, it has yet to establish effective accountability for project impacts. Other multilateral lenders have channels for those adversely affected by projects to communicate their concerns.

### Sustainable Development Goals

President Xi called on BRICS members to integrate the UN’s Sustainable Development Goals (SDGs) into their national development strategies at a meeting of business leaders in Johannesburg.

The private sector has a big role to play in implementing the SDGs and among BRICS countries Chinese companies are leading, according to recent research published by the journal Sustainability.

“China stood first in adopting the sustainable development goals,” found the study, which analysed the vision and mission statements of five multinational companies from each of the BRICS members and their compatibility with the SDGs.

“The NDB and AIIB are by not comprehensively documenting greenhouse gas emissions of their projects.”

However the policies of Chinese companies, like their Indian counterparts, focus primarily on SDG 9: Industry, Innovation and Infrastructure, and there is a strong tendency to overlook those relating to the environment.

A majority of the companies in member countries neglected climate action (SDG 13) and the preservation of the ocean (SDG 14). Nor have meetings of BRICS countries resulted in better coordination on meeting the goals, the research said.

Ms Lu said that the NDB and AIIB are also failing to take bold steps in the fight against climate change by not comprehensively documenting the greenhouse gas emissions of their projects. This, she suggests, inhibits their ability to deliver on the promise to support sustainable development:

“They may be new players, [but] the AIIB and NDB are still playing the same old game,” she said. ☞

*This article is republished from Diálogo Chino*

*Robert Soutar is Managing Editor of Diálogo Chino, based in London.*



# 香港会成为“一带一路” 绿色融资引擎吗？

亚洲金融中心香港正着眼于“一带一路”的绿色发展，  
但也有人“对绿洗”风险表示担忧。

□ 凯莉·朗



香港希望在“一带一路”上成为主要的绿色金融市场

近年来，全球“绿色金融”需求增长强劲。作为亚洲的金融中心，香港希望成为中国政府“一带一路”倡议主要的“绿色”资本市场。

“我们看到2018年香港的绿色债券发行量增长了60多亿美元，这已经超过了2017年全年的数额。”香港财经事务及库务局副局长陈浩

濂于6月28日在香港“一带一路”高峰论坛上，就绿色金融问题发言时表示。

“这反映了金融市场的实力，以

及全球机构对香港成为绿色金融区域中心的信心。”他补充说。

香港金融管理局近期宣布了127.4亿美元的政府绿色债券发行计划。

中国是世界上最大的绿色债券市场。去年绿色债券发行量约300亿美元，占全球发行总量的五分之一以上，相比2015年10亿美元的发行量呈显著增长，特别是随着潜在利润丰厚的“一带一路”项目逐步结出丰厚的成果，绿色债券的需求将继续保持强劲。

据亚洲开发银行（ADB）估计，2016年到2030年，全球年基础设施投入将达1.7万亿美元左右。不过，汇丰银行基础设施和房地产集团执行董事乔纳森·德鲁表示，这可能是保守估计。

他表示，“我知道的数据更高。从全球范围来说，大概是七或八（万亿），亚洲则接近五万亿。从这个意义上说，资本量十分巨大，但是对于我们这些金融从业者来讲，真正的挑战是如何将这些资金投入到需要的地方。”

## 绿色融资机遇

香港铁路有限公司司库彭海兴称，对于港铁这样的机构来说，转向绿色融资合情合理。

“一列火车的运力相当于25辆公共汽车或1500辆汽车。很明显，我们的碳排放量低于其他交通运输方式。”他表示，“我们是一家促进绿

“

在多数情况下，绿色融资和绿色债券的监管都很宽松，而且在某些情况下，绿色金融是对看起来存在很多环境问题的工程进行粉饰的一种手段。

”

色出行的企业，无论我们以何种方式融资，应该都是绿色融资。”

## “一带一路”

毕马威“商业报告和可持续发展”合作伙伴吴柏年先生强调称，“一带一路”和绿色金融二者密不可分，可成为促进发展中国家经济增长的方式。

“真正的机会是帮助这些经济体实现低碳经济的跨越式发展。我们已经从西方国家以及中国身上吸取了教训……我们还要重蹈覆辙吗？”他说道。

但并非所有人都和他一样乐观。

## “绿洗”的风险

保护生物学家比尔·劳伦斯对“中外对话”表示，“我对当前‘一带一路’建设的模式表示担忧，原因有很多，包括所谓的‘绿洗’风险。”劳伦斯是澳大利亚凯恩斯詹姆斯·库克大学的杰出研究学者，也是ALERT（领先环境研究人员和思想家联盟）的创始人和主任。他曾对“一带一路”可能带来的破坏性影响发出过警告，称其为“有史以来环境风险最大的投资”。

他警告说，“在多数情况下，绿色融资和绿色债券的监管都很宽松”，而且在某些情况下，绿色金融是“对看起来存在很多环境问题的工程进行粉饰”的一种手段。

此外，还存在差异化监管的问题。

欧洲投资银行和中国金融学会绿色金融专业委员会在2017年联合发布的报告中呼吁，要对绿色金融、债券和项目进行统一定义。

目前对绿色债券没有统一的定义，而市场通常认为绿色债券的发行人将利用债券收益来支持保护或改善环境的项目。

而关于对各个国家政策的实施，监管框架，以及围绕绿色工程和绿色融资举措的监督和审查等问题的担忧仍然无解。

即便政府倡导的政策出发点是好的，但项目落实层面仍显不足，在发展中国家更是如此。

当前，“一带一路”东道国在执行环境和社会保障方面负有更大的责任。但是，这些国家的能力往往有限，无法保障强有力的环境监管和社会监督。☞

凯莉·朗，自由撰稿人，现居香港。

# Hong Kong seeks bigger role in BRI

China's green bond market doubled in 2017 and the city wants to channel it

□ Kayleigh Long

International demand for “green finance” has experienced strong growth in recent years. As Asia’s financial centre, Hong Kong is eager to become the primary “green” capital market for Beijing’s colossal Belt and Road Initiative (BRI).

“In 2018, we have seen over US\$6 billion in growth of green bond issues in Hong Kong. This has already exceeded the full-year figure for 2017,” said Joseph Chan, under secretary for Financial Services and the Treasury for the Hong Kong government, speaking at a panel on green finance at the Belt and Road Summit in Hong Kong on June 28.

“This reflects the strength of the financial market and confidence that global institutions place in Hong Kong as the region’s green finance hub,” he added.

Last month, the Hong Kong Monetary Authority announced a planned US\$12.74 billion green bond programme.

China’s green bond market is among the world’s largest. Some US\$30 billion in green bonds were issued last year, comprising more than one-fifth of the global total. This is a significant increase on the US\$1 billion issued in 2015,

and demand remains strong – particularly as potentially lucrative BRI projects come closer to fruition.

The Asian Development Bank (ADB) estimates that between 2016 and 2030, there will be an annual infrastructure requirement of some US\$1.7 trillion, globally. Although Jonathan Drew, managing director of HSBC’s Infrastructure and Real Estate Group, suggested the figure may be conservative.

“I’ve seen higher numbers than that. Globally, it’s seven or eight [trillion]. Asian figures are up nearer to five trillion. When you look at the context, the capital is there. The challenge for those of us in the financial sector is how to bring that capital to where it’s needed,” he said.

## Green finance opportunity

Hong Kong’s Mass Transit Railway corporation treasurer David Pang said the shift toward green finance was a logical step for organisations such as his.

“One train can carry passengers equivalent to 25 buses

“The question of how policies are implemented across borders and regulatory frameworks, along with concerns surrounding oversight and scrutiny of green projects and green-financed initiatives, remain unanswered.”

or 1,500 cars. You can see that our carbon emissions are less than other forms of transportation,” he said. “We are a greening business. And whatever finance we raise, we should be doing green finance.”

### Belt and Road

KPMG Business Reporting and Sustainability partner Pat-Nie Woo highlighted the importance of seeing BRI and green finance as natural bedfellows, as well as instruments to foster economic growth in developing countries.

“The opportunity really is to help these economies leapfrog into the low-carbon economy. We’ve learned our mistakes in the West, in China... Do we need to repeat those?” he said.

Not all share his optimism.

### Risk of greenwashing

“I have great concerns about the way the BRI is shaping up for a whole score of reasons – including what could broadly be called ‘greenwashing’,” conservation biologist Bill Laurance told chinadialogue. Laurence is Distinguished Research professor at James Cook University in Cairns, Australia, as well as founder and director of ALERT (Alliance of Leading Environmental Researchers and Thinkers). He has warned of the devastating impacts of the BRI, calling it “environmentally, the riskiest venture ever undertaken”.

He cautioned that “green financing and green bonds is being used loosely in lots of contexts,” and that in some cases green finance was a means to “tart-up a project that looks like it’s got a lot of environmental problems”.

There is also the matter of regulatory disparity.

A 2017 joint report from the European Investment Bank and the Green Finance Committee of the China Society for Finance and Banking called for a harmonised definition of green finance, bonds and projects.

There is no single definition for what qualifies as a green bond, but the market generally accepts that the issuer will use bond proceeds to support projects that protect or improve the environment.

The question of how policies are implemented across borders and regulatory frameworks, along with concerns surrounding oversight and scrutiny of green projects and green-financed initiatives, remain unanswered.

Even if Beijing-led policy has good intentions, implementation at the project level can still fall short, particularly in developing countries.

Currently, BRI host countries have the greater responsibility to enforce environmental and social safeguards. However, these countries often have limited capacity to ensure robust environmental and social oversight is in place. ☞

*Kayleigh Long is a freelance journalist based in Hong Kong.*



# 气候领袖光环下， 加州如何摆脱石油依赖？

就在加州主办气候行动峰会之时，它却面临着大宗进口亚马逊石油的质疑。

□ 费尔明·库普



全球气候行动峰会期间，反对者抗议加州开发化石燃料

人称“世界第五大经济体”的加州也被视为气候变化的行动典范。2005年以来，该州实施了一系列减排政策，并且重点推广可

再生能源和开发清洁技术。

目前，加州主办的全球气候行动峰会（GCAS）正在旧金山举行，目的就是展示自身在全世界其他城

市和地区中的气候领导地位。但就在此时，成百上千的抗议者齐集会场，向州长杰里·布朗示威。

前加州参议员弗兰·帕弗蕾说：

加州在气候和环境方面取得了很多成就，但加州的炼油厂数量居全美第三，并且还进口石油进行加工。根据“亚马逊观察”的数据，加州炼油厂从西亚马逊盆地购买的石油占该地区石油出口量的50%。

“我们的四千万人民既有强大的消费能力，也有能力建立一个投资和创新市场。我们创造了很多改变了世界的技术和政策。但加州应该做得更多，尤其是现在。”

全球气候行动峰会于9月14日闭幕，虽然各国代表在三天活动期间举行了各种会议，畅所欲言，但这次峰会更被视为一场展示布朗州长气候成就的庆功大会。布朗将于今年卸任，从而步下他为之奋斗多年的美国政坛。

其前任阿诺德·施瓦辛格在任期间主张实施更严格的气候法律法规，而布朗继承了这条道路。加州承诺到2030年减排40%，还执行了一项财政刺激计划，促使企业减少污染。

根据最近的立法，加州到2045年将实现电力系统的零碳排放，布朗州长还签署了一项行政命令，要求同时实现经济的完全去碳化。这是一个巨大的挑战。据环境咨询机构“未来十年”最近的一份报告，2006年到2016年加州经济增长16%，人口增加9%，但排放只减少了11%。

“未来十年”创立者诺埃尔·佩里说：“经济去碳化对加州来说将是一场大革命。这极富雄心，但我们过去已经实现了更加宏伟的目标。我们在可再生能源、能效、清洁技术和环境政策方面都是领袖。”

加州公共政策研究所最近的一份调查显示，超过一半的加州人把该州在世界气候变化领域的领袖地位看得很重。三分之二的人认为气候变化的影响已经显现，80%的人认为这是一个严重问题。

尽管如此，加州仍然面临很大挑战，其中之一就是占该州总排放41%的交通部门。根据官方统计，全州四千万人口拥有3200万辆汽车，其中电动汽车只有40万辆。

过去四年中，交通排放有所增加。一是因为大城市房价上涨，居民的通勤距离更远；二是因为加州五大都市圈中有四个的公共交通利用者数量减少。

“在加州，我们每年的总行驶里程为5550亿公里。在交通上我们没有取得什么进展，必须有所改进。为此，我们需要让能源更加绿色，推广使用电动汽车。”布朗州长的环境政策顾问肯·阿历克斯如是说。

他还说：“加州在气候和环境方面取得了很多成就，但我们离十全十美还有相当大的距离。我们要实现经济转型，这样世界其他地方才能追随我们的脚步。”

## 中国、石油与亚马逊

化石燃料是全球气候行动峰会期间反对者们抗议布朗的焦点。

加州是美国第六大油气生产州。据Fracktracker Alliance最近的一份报告，2012年到2018年加州共批准了53825口陆上油井和238座海上油井。

与此同时，加州的炼油厂数量居全美第三，并且还进口石油进行加工。根据“亚马逊观察”的数据，加州炼油厂从西亚马逊盆地购买的石油占该地区石油出口量的50%。

据“亚马逊观察”说，推动亚马逊石油开采的是国营公司和中国的开发银行。2010年以来它们已经提供了1520万美元的贷款，都是用石油收入偿还。

“亚马逊观察”传媒与公共事务经理莫伊拉·比尔斯说：“亚马逊出口的大部分石油被直接送到加州的炼油厂，这将加州与热带森林的破坏联系了起来，而受影响的尤以离油田最近的村落为甚。”

石油开采对亚马逊的生物多样性（这里是全球生物多样性最丰富的地区）和原住民的生活都有显著影响。

很多原住民都强烈反对在他们的土地上搞开发项目。为此，在全球气候行动峰会期间原住民代表反复向布朗抱怨，要求加州停止使用化石燃料并致力于经济的无碳化。但是，很多分析家都认为目前这还不太可能。

同样，一群诺贝尔奖得主和超过 800 名的社会和环境运动代表向布朗递交了一份正式信件，赞扬他在气候方面的领导作用，但同时也强调加州在遏制化石燃料开采方面的“道德责任”。

厄瓜多尔亚马逊基奇瓦 - 萨拉亚库部落首领米里安·西斯内罗斯说：“我和来自世界各地的兄弟姐妹一起进行这次抗议，因为我们知道无论在亚马逊还是其他地方都必须让化石燃料留在地下。”

## 气候影响

加州在气候变化影响面前的脆弱性在过去几年中变得更加明显。

根据加州政府的最新（第四次）气候变化分析，进入 21 世纪以来温室气体排放导致该州的温度上升了 1 到 2 摄氏度。

与此同时，按照目前的行动速度，到 2100 年加州的温度将提高 5.6 到 8.8 摄氏度，还伴随着海平面上升和森林火灾。

如果布朗提出的完全无碳化经济计划能够实现，这些后果就会有所减轻。

加州本地网站 Calmatters 网站的记者朱莉·卡特认为，石油和交通产业的改变及电动汽车在客货运输领域的使用将是关键。

她说：“石油产业在加州的势力很大，它为很多人提供工作，是经济的主要动力，但我们现在正在逐渐摆脱它。”

费尔明·库普，阿根廷记者，致力于环境报道

# California's climate leadership contradiction

The state has questions to answer over Amazonian oil

□ Fermín Koop

With the fifth largest economy in the world, California is widely seen as a model to follow when it comes to action on climate change. Since 2005, the state has implemented a set of policies to reduce emissions, with a particular focus on rolling out renewable power and developing clean technologies.

Nevertheless, hundreds of protestors gathered in San Francisco to protest against Governor Jerry Brown as part of the Global Climate Action Summit (GCAS) last week, an event organised by California to demonstrate its climate leadership along with other cities and regions worldwide.

“We are forty million people with high consumer power and the capacity to create a market for investment and innovation. We develop a lot of technology and policies that make a difference in the world,” said ex-senator Fran Pavley. “But California should do more, especially now.”

The GCAS, which ended on September 14, consisted of three days of meetings and announcements from international representatives, but more than anything it was seen as a celebration of Brown's climate legacy. The governor will finish his term this year after a long political career.

Brown followed the path laid out by predecessor Arnold Schwarzenegger on climate, arguing for tougher laws and rapid action. California has committed to reduce its emissions by 40% by 2030 and it implemented a programme of financial incentives so that companies produce less contamination.

Following recent legislation, the state will work toward a zero carbon power system by 2045, and Governor Brown also issued an executive order to totally decarbonise the economy by the same date. It is a huge challenge, considering that between 2006 and 2016, the economy grew 16%, the population expanded 9% and emissions were only reduced 11%, according to a recent report by environmental consultancy Next 10.

“Decarbonising the economy would be a huge revolution for California. It is ambitious, but we have achieved more

“

In California, we drive 555 billion kilometres every year.

”



significant goals in the past,” said Noel Perry, founder of Next 10. “We are leaders in renewable energies, energy efficiency, clean technology and environmental policies.”

According to a recent survey by the Public Policy Institute of California, it is very important to more than half of Californians that the state is a world leader in climate change. Two in three consider that the effects of climate change are already happening, and this is seen as a serious problem by 80% of the population.

But California still has big challenges, particularly its transportation sector, which accounts for 41% of the state’s emissions. According to official statistics, there are 32 million vehicles in operation for a population of 40 million, of which only 400,000 are electric.

Emissions from transportation have increased in the past four years due to residents travelling further as a result of rising house prices in the major cities. In addition, the number of public transport users has decreased in four out of five of the state’s biggest metropolitan areas.

“In California, we drive 555 billion kilometres every

year. We haven’t made much progress in the transportation sector and we need to make advances. In order to do so, we need to make the energy sector greener and push the use of electric cars,” said Ken Alex, an advisor on environmental policy to Governor Brown.

“California achieved many things in climate and environment, but we are far from perfect. We want to transform our economy so the rest of the world can follow in our footsteps,” he added.

## China, oil and the Amazon

Fossil fuels were the focus of the protests against Brown during GCAS. California is the sixth largest state producer of oil and gas in the United States. According to a recent report by the Fracktracker Alliance, the state authorised 53,825 new onshore wells and 238 offshore ones between 2012 and 2016.

The state has the third most oil refineries in the country, and imports oil to be processed. According to Amazon



© Amazon Watch

According to Amazon Watch, 50% of oil exports from the western Amazon Basin are bought by refineries in California

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Watch, 50% of oil exports from the western Amazon Basin are bought by refineries in California.

The extraction of oil in the Amazon is driven by state companies and Chinese development banks according to Amazon Watch.

“The vast majority of the oil exported from the Amazon comes to the refineries in California directly, linking the state to the destruction of tropical forests,” said Moira Birss, communications and public affairs manager at Amazon Watch. “The communities closest to the exploited sites are the most affected.”

Oil extraction in the Amazon has significant impacts on biodiversity – it being one of the most biodiverse places globally – and for indigenous peoples.

Many of them have strongly opposed development projects on their land. This is why, during GCAS, indigenous representatives repeatedly complained to Brown to stop the use of fossil fuels in California and to commit to an economy that is completely free of them. However, many analysts believe this is not yet possible.

All the same, a group of Nobel prize winners and more than 800 representatives of social and environmental movements sent Brown a formal letter, congratulating him for his leadership on climate, while highlighting California’s “moral responsibility” when it comes to slowing down the exploitation of fossil fuels.

Mirian Cisneros, president of the Kichwa de Sarayaku tribe in the Ecuadorian Amazon said: “I am in this great protest with my brothers and sisters from all around the planet because we understand that it is necessary to leave fossil fuels in the ground, both in the Amazon and worldwide.”

## Climate impacts

California’s vulnerability to the impacts of climate change has become clearer in the past few years.

According to the fourth and most recent analysis of climate change carried out by the Californian government, the temperature of the state has increased between one and two degrees Celsius on average from the beginning of the twentieth century as a result of greenhouse gas emissions.

The temperature could increase between 5.6 and 8.8 degrees Celsius on average by 2100 depending on action to reduce emissions (from the same baseline). This will be accompanied by an increase in sea level and forest fires.

These consequences could be reduced with Brown’s plans to achieve a totally decarbonised economy.

According to Julie Cart, an environmental journalist covering California issues with Calmatters, changes to the state’s oil and transportation industries and the use of electric cars both for passengers and cargo will be key.

“The oil industry is very powerful in California. It employs many people and it usually drives the economy, but now we are moving away from it,” she said. ☺

*Fermin Koop is an Argentine journalist, specialising in the environment with experience across diverse publications such as the Buenos Aires Herald, Clarin, Ambito Financiero, Buena Salud and Notio Noticias.*

# 锂电池报废大潮即将来袭

随着电动汽车的普及，天量废旧电池将何去何从？

□ 阿比盖尔·贝尔



大量废旧电池将在2025年前后进入回收市场

**到**2020年，汽车行业对锂电池的需求预计将超过消费类电子产品。

中国计划到2025年销售700万辆电动汽车，而这也使该

国成为这一增长背后迄今为止最大的推动力。根据国际能源机构（International Energy Agency）的数据，2017年全球电动汽车保有量仅为370万台。

但随着锂电池（蓄电池的一种）成为数百万电动汽车的一部分，并且挤入电力存储等新兴市场，回收业是否准备好迎接蓄电池退役的大潮？



## 电池市场迅猛增长

未来十年，电动汽车市场预计将大幅增长。

2017年，中国插电式电动汽车共计卖出77.7万辆，较上年增长53%，占全球120万辆电动汽车总销售量的一半以上。

美国市场也在持续增长。据报道，2012至2016年间美国电动汽车销售平均增长了32%。到2025年，电动汽车预计将占美国乘用车销量的20%，而2017年这一数字仅为1%多一点。

欧洲正在大力推广电动汽车。英法两国将从2040年起禁止柴油和汽油汽车的销售，德国则更进一步，提议将禁售时间定为2030年。

根据高盛集团估计，特斯拉S型电动汽车搭载的电池使用的锂比1万部智能手机还要多。随着电池在电动汽车和电网电力存储领域的应用越来越广，锂电池的需求将随之增长。

“我们预计到2027年，全球锂电产业的年产量将从现在的1亿千瓦时增长到近8亿千瓦时。”凯恩能源研究咨询公司（Cairn Energy Research Advisors）总经理萨姆·杰夫说，“这几乎增长了8倍，其中固定型蓄电池只占不到8%，大部分都是车载电池。”

据摩根士丹利的数据，由于需求不断增长，2016到2018年间锂价翻了一番还多。

锂的开采对环境的影响也很大。锂矿多存在于玻利维亚和智利等地的盐滩，开采过程中会用到有毒物质。

我们目前回收锂电池的技术还不够高效。“通常会把废旧电池熔化，然后回收里面的钴。”杰夫说，“目前

还没有回收锂的方法，但最终还是找出办法的。”

回收锂和锂电池中的其他成分将是一个抑制新材料需求增长，并减轻开采负面影响的方法。

## 锂电回收的局限

目前，全球范围内锂电池的回收量还不清楚。过去10年很大一部分锂电池都是用在手机等小型消费类电子设备上。这些锂电池通常都和电子设备一起处理了。

大多数电动汽车尚未达到使用年限。当代第一辆由锂电池驱动的全电动汽车特斯拉Roadster于2008年上市。也就是说，第一代电动汽车的电池还没有达到需要回收的年限，但时间正在流逝。

据估计，欧洲的锂电池回收率为5%，但各个区域和产业部门之间的回收率存在差异。欧洲、北美和日本都开展了旨在开发有效回收技术的项目，其中以美国和加拿大的公司较为领先。

## 报废潮即将到来

托德·科伊是Retriev技术公司的副总裁，该公司在北美拥有并经营着两家锂电池回收企业，一家位于加拿大不列颠哥伦比亚省（卑诗省）的特雷尔，另一家位于美国俄

亥俄州的兰卡斯特。后者由美国能源部部分出资建立，专门用于回收插电式混合动力车和全电动汽车的电池。

科伊预测，电动汽车和电网电力存储使用的较大型的电池未来会更容易回收。随着广泛的使用，这些电池将在全球使用的锂电池中占更高的比例。

“体积较小的锂电池在使用后仍将被丢弃，或者是和设备（无论是便携式工具，还是电子设备）一起被遗忘在抽屉的角落里。”科伊说，“混合动力车和电动汽车或者储能设备中的电池因为体积较大，不易丢弃，所以回收率应该会较高。”

总部位于比利时的矿业公司优美科（Umicore）经营了一家电池回收试点公司，每年可冶炼7000吨电池，这在目前足以满足客户需求，但公司预计回收量将会增加。

“大量废旧电池将在2025年前后开始进入回收市场。”优美科发言人马基林·希尔斯说，“我们预计未来十年年回收量将超过10万吨。”

## 回收不易

制定标准的锂电池回收程序很难，原因在于不同的锂电池其化学成分存在很大的差异。有些电池组分注重的是输出电能，有些注重的是能量密度，还有一些则注重的是

大量废旧电池将在2025年前后开始进入回收市场。  
优美科发言人马基林·希尔斯说，预计未来十年年回收量将超过10万吨。



使用寿命。相比铅酸蓄电池等其他类型的电池。组分的多样性让锂电池的回收更加复杂，成本更高。

还有一个问题是，回收过程中要投入多少能源。机械分离所需的能源和时间都比较少，但回收的东西有限；如果使用化学分离，电池将被溶解，然后采用化学方法分离各种材料。另一种方法是将电池磨成细小的粉末，之后通过不同的分离阶段对混合物中的各种成分进行分离，这种方法的投入最大。但没有一种可以做到完全回收电池。

欧盟目前要求对达到使用寿命的车载电池进行回收。“现在他们只是熔化电池，回收里面少量的钴，然后把废渣扔到垃圾填埋场。”杰夫说，“法律条文的字面意思是遵守了，但精神显然没有体现。”

“我们真正需要的是开发新的回收方法，将其工业化，让回收锂变成

大家负担得起的活动。”他说，“许多人正在为此努力。最终，一些方法将成功经受住检验，从而建立起一个更加彻底的回收行业。”

## 废旧电池的重生

另一种选择是通过重新调整电池的用途，延长其使用寿命。例如，在高性能的电动汽车电池彻底废弃之前，将其拆下来用于存储电力。

目前最可能使用二次电池的是家用电能储存。但这里有一个问题，电池使用一段时间后，其能量密度就会降低，储电量不如前，这就意味着相同数量的电能需要更多的电池来储存，因此占用更多的物理空间，成本也会提高。此外，制造商无法像新电池那样，轻易保证它们的性能。

日产是二次电池市场的先驱。2018年3月，日产公布了一个项目，

用公司旗下聆风电动汽车的电池为离网路灯储存电能。该项目位于日本的浪江町，二次电池和一块太阳能电池板连在一起，白天充电，晚上为路灯供电，预计今年年底将全面开展安装工作。

如果像日产这样的制造商能够为二次电池找到市场，那么随着未来越来越多的房屋脱离电网，实现电力自给，二次电池将来很可能会大有可为。

根据国际能源机构的数据，2009至2016年间电池的成本降低了4倍，所以未来二次电池的成本也会相应降低。

“长远来看，”杰夫说，“如果要在全球范围内全面推广电动汽车，电池回收就是无法回避的问题。但这得是几十年后的事情了。”

阿比盖尔·贝尔，英国利兹自由撰稿人

# Are recyclers ready for the coming glut of lithium-ion batteries?

As transport goes electric,  
Abigail Beall asks what will happen to all the used batteries

□ Abigail Beall

By 2020, demand for lithium-ion batteries from the automotive sector is expected to overtake that of consumer electronics.

By far the biggest driver of this increase is China, which plans to sell seven million electric vehicles by 2025. Consider that in 2017 the entire global fleet of electric vehicles totalled just 3.7 million according to the International Energy Agency.

But as lithium-ion batteries (a type of rechargeable battery) find their way into millions of electric vehicles, and push into new markets such as electricity storage, is the recycling industry prepared for the coming glut of used batteries?

## Ready, steady, go

The electric vehicle market is expected to grow significantly in the next decade.

In 2017, China accounted for more than half of the 1.2 million electric vehicles sold worldwide. Sales of plug-in electric vehicles in China totalled 777,000, an increase on the previous year of 53%.

The United States market is also experiencing sustained growth. It has been reported that electric vehicle sales grew on average by 32% between 2012 and 2016, and that by 2025, electric vehicles may account for 20% of all passenger vehicles sold in the US, up from just over 1% in 2017.

Europe is going electric too. France and the UK will ban the sale of new diesel and petrol cars by 2040, and Germany is leading the way with a ban proposed for 2030.

A Tesla Model S uses more lithium in its batteries than 10,000 smartphones, according to an estimate by Goldman Sachs. As more batteries are used in electric vehicles and for grid-scale electricity storage, demand for lithium-ion batteries will increase.

“A Tesla Model S uses more lithium in its batteries than 10,000 smartphones, according to Goldman Sachs.”

“We expect the global Li-ion industry to grow from 100 gigawatt hours of annual production to almost 800 gigawatt hours in 2027,” says Sam Jaffe, managing director of Cairn Energy Research Advisors, a battery consultancy. “That’s nearly an eightfold increase. Stationary storage will account for less than 8% of that. The vast majority will go into cars,” he adds.

The growing demand for lithium has seen prices more than double between 2016 and 2018, according to Morgan Stanley.

But the mining of lithium has major environmental impacts. Lithium is extracted from salt flats in countries such as Bolivia and Chile, and toxic substances are used to remove it from the ground.

The techniques we currently have for recycling lithium-ion batteries are not efficient enough. “Usually they are melted down into a slag and then the cobalt is recovered,” says Jaffe. “There is no method currently in use to recover the lithium. Eventually, that will need to be done.”

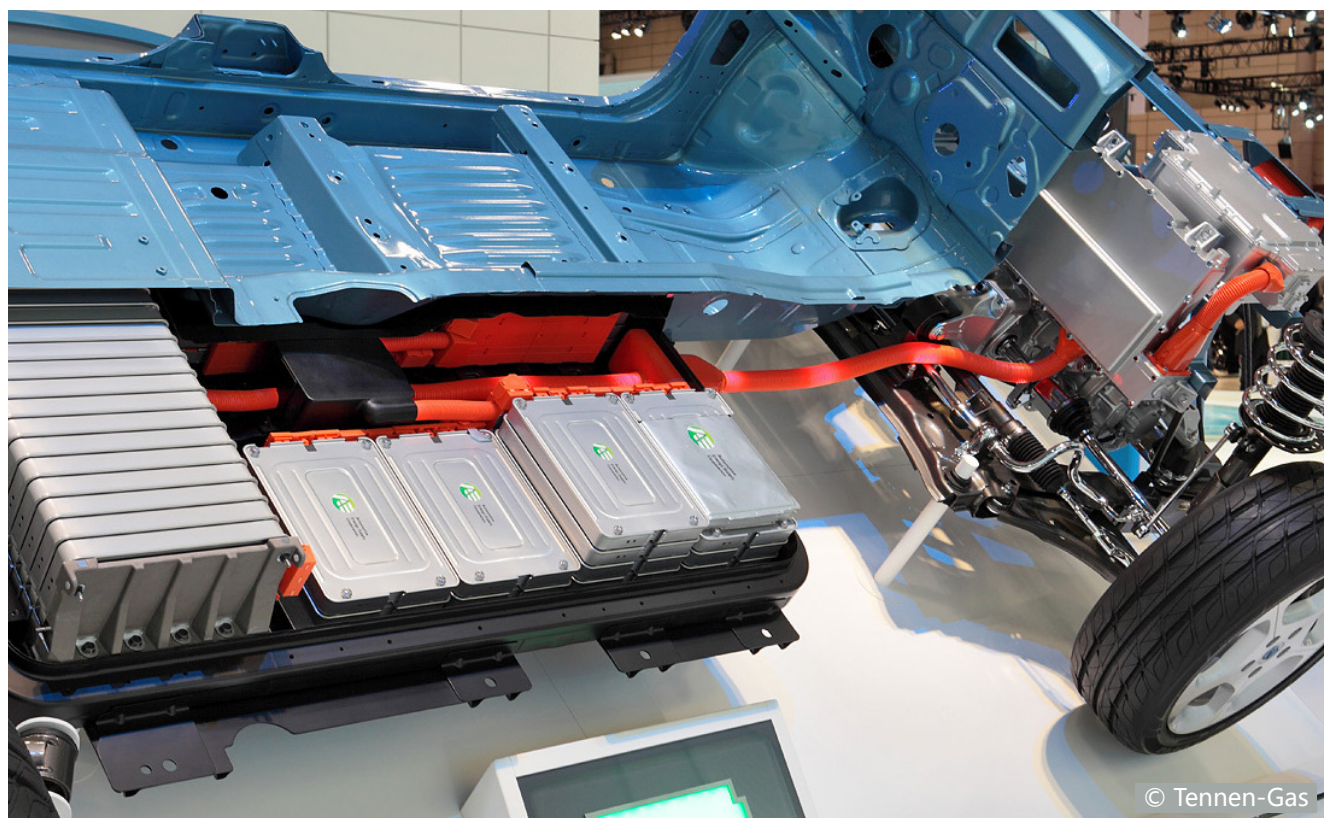
Recycling lithium, and other components of lithium-ion batteries, would be one way to curb demand for new materials, and mitigate the negative impacts of extraction.

## Limited recycling

As it stands, there is no clear picture of the amount of lithium-ion battery recycling that is done globally. A high percentage of the lithium-ion batteries used in the past decade are found in small consumer devices like phones and are typically disposed of with the devices.

Most electric vehicles are yet to reach the end of their operating lives. The first modern, all-electric car powered by a lithium-ion battery, the Tesla Roadster, was first sold to customers in 2008. This means the first generation of electric vehicle batteries have not got to a recycling stage yet, but the clock is ticking.

In Europe it is estimated that 5% of lithium-ion batteries are recycled, but the rate of recycling varies across regions



*An electric vehicle battery pack and drivetrain*

“

The huge variety of lithium-ion batteries makes recycling more complicated and expensive than other battery types.

”

and sectors. In Europe, North America and Japan, there are projects looking to develop effective recycling technologies, with companies in the United States and Canada leading the way.

### More batteries

Todd Coy is vice president of Retriev Technologies, a company that owns and operates two lithium-ion battery-recycling facilities in North America; one in Trail, British Columbia and another in Lancaster, Ohio. The Lancaster facility was partly funded by the US Department of Energy, and it has been built specifically to recycle batteries from plug-in hybrid and all-electric vehicles.

Coy predicts that the larger batteries used in EVs and grid-scale storage will be easier to recycle in future, and as they become more widely used they will take up a larger proportion of lithium-ion battery use worldwide.

“Smaller, post-consumer lithium-ion batteries will continue to end up discarded, or in kitchen drawers, and stay with their devices, whether it is a portable tool or electronic device,” says Coy. “Larger batteries used in hybrid and electric vehicles or energy storage should see a higher recycling rate due to their size and will not be easily discarded.”

Belgium-based mining company Umicore also operates a pilot battery recycling facility, which can smelt 7,000 tonnes of batteries each year. At the moment, this is enough to keep up with demand, but the company expects volumes to increase.

“Massive volumes of spent batteries will start coming on to the market for recycling around 2025,” says Marjolein Scheers, a Umicore spokeswoman. “We expect volumes to be higher than 100,000 tonnes per year in the next decade.”

### Hard to recycle

It is difficult to develop a standard procedure to recycle lithium-ion batteries because their chemical composition varies so much. Some are developed for their power, some for energy density, and others for their longevity. Compared to other types of batteries, such as lead acid, this variety makes lithium-ion battery recycling much more complicated, and therefore expensive.

There is also the issue of how much energy to put into the recycling process. Mechanical separation takes less energy and time but limits what can be recovered. Using chemical separation, cells are dissolved and chemical methods used to separate out materials. Another method is to grind batteries into a fine powder before then putting the mixture through various stages of separation, which takes the most effort. However, none of these methods fully recycle the battery.

The EU currently requires electric vehicle batteries to be recycled at the end of their life. “Right now, they just melt down the batteries, recover what little cobalt is in them and then throw the slag into landfill,” says Jaffe. “The letter of the law is followed, but the spirit clearly isn’t.

“What is really needed is for new recycling methods to be developed and industrialised that make recovering the lithium affordable,” he says. “Many efforts are under way to figure that out. Eventually, some of those methods will prove to be successful and a more thorough recycling industry will become established.”

### Second life batteries

Another option is to prolong the working life of batteries by repurposing them. One example is to use high performance



electric car batteries, which are removed from vehicles before they stop working altogether, to store electricity.

The most likely use of second life batteries at the moment is in home energy storage. But there is a problem because they become less energy dense with greater usage and so cannot hold as much energy as they used to. This means you need more of them to store as much energy, taking up more physical space and raising costs. Also, manufacturers cannot guarantee their performance as easily as with a new battery.

One pioneer of the second battery market is Nissan. In March 2018, it announced a project to use batteries from their LEAF electric cars to store energy for off-grid streetlamps. Attached to a solar panel, the second life batteries charge during the day and power streetlights at night in the Japanese town of Namie. Full-scale installation is expected at the end of this year.

If manufacturers like Nissan can find a market for these batteries, then it is likely they will have an important future role as more homeowners produce their own electricity off-grid and manage their power supply and demand.

Between 2009 and 2016, battery costs were cut by a factor of four, according to the International Energy Agency, so this kind of progress could be reflected in second life batteries in the future too.

“For the very long term,” says Jaffe “if the world is ever to get to 100% electric vehicle penetration, then recycling is a necessity. But that’s many decades in the future.”

*Abigail Beall is a freelance journalist based in Leeds, UK.*

# 公有还是私有？ 全球水管理面临抉择

由于私有化未能奏效，很多城市正在重新考虑实行水务市政化。

□ 赫蒂·奥布莱恩

**水**似乎是取之不尽用之不竭的：它覆盖了地球表面的 70%，在江河中奔流，从天空中落下。但气候变化让世界水资源供给变得不再可靠。随着水资源短缺日益严重，全球各地正在掀起一场要求终止法人所有权、挑战水资源私有化的地方运动。

安全的淡水资源仅占世界水资源总量的 2.5%，而且往往藏在荒僻的冰川或深深的地下，很难获取。气候变化使不同地方旱的旱涝的涝，增加了淡水供应管理的难度。热浪已经逼得一些城市钻取更深的地下水或进行海水淡化。而在洪水地区，淡水虽然增加了，却因为降雨更猛而更难储存。

极端天气给水务管理带来新的挑战，同时工业化和城市化也增加了淡水的需求。联合国估计，过去一个世纪用水量超过了人口的增长速度。农业淡水用量占到总用水量的 70%。

随着更多人搬进城市，现有的基础设施已经不堪重负。发展中国家 27% 的城市居民家里没有自来水。

这些全球性的趋势造成了区域性的问题。水资源紧张地区（一年中的部分时间或整年淡水受限）的人口数量将会增加。水资源不足经常会加剧已有的社会断裂，基础设施落后让城市边缘陷入孤立，供水短缺引发与水相关的冲突。在这些不确定的状况下，谁能把水管理好这个问题就至关重要了。

## 私有化的承诺

与此同时，短缺也带来了获利的良机。水和卫生已经成了被威立雅和苏伊士等跨国公司主导的朝阳产业。花旗集团全球首席经济学家威廉·比特将水形容为一个“资产

类别”，其重要性最终将会超过石油、铜和贵金属。活动家莫德·巴洛写道，如今多数大银行都建立了专门针对水产业的投资基金。

英格兰 1989 年成为第一个卖掉其水务系统的国家，但水务私有化的问题仍然存在政治争议。水务私有化通常都是以政府将水务部门租赁给私营企业的公私合营方式进行。正如新加坡国立大学李光耀公共政策学院水政策教授伊度阿尔多·阿拉拉尔所写的，水务私有化倡导者们之所以认为值得这样做主要有两个原因：

首先，私营部门服务效率更高。英格兰的政治家们期待市场竞争能加速改进公用服务并降低成本。第二个原因是财务上的。发展中国家都在殚精竭虑地为基础设施项目筹资，而将水务让给私营部门能吸引外来投资。

上世纪 90 年代以来，世界银行就制定了这方面的政策。它与国际货币基金组织联手向发展中国家提供贷款，条件是将公用事业私有化。玻利维亚等国的理念就是水务私有化能填补国家留下的空缺。比如，世界银行 1999 年在科恰班巴市写道，“贫困国

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随着水资源短缺日益严重，全球各地正在掀起一场要求终止法人所有权、挑战水资源私有化的地方运动。  
”

“列格坦研究所2017年进行的一项调查表明，83%的英国人倾向于水务国有化。荷兰的倡导组织“跨国研究所”发现，实行公共供水的城市水质更高、水价更低。”

家政府经常受地方腐败的困扰，根本没有资源”管理其水务。

## 成本明晰，收益低下

但有证据表明各国政府对于卖掉水务部门所带来的好处过于乐观了。1989年英格兰实行水务私有化以来，家庭平均水费增加幅度比通胀率高出40%。在大多数私有化个案中，企业仍然依赖公共基金。公共服务国际研究小组(PSIRU)的一项研究发现，1991年到2012年这些企业从欧洲复兴开发银行获得了近5亿欧元。

负责伦敦供水的泰晤士水务公司就体现了水务私有化对公共资金的依赖。2012年该公司被要求为一条新的大型下水道投资，它声称负债过重拿不出钱，但却给股东和高管分红数百万英镑，反而是要消费者们通过支付更多水费为这条新下水道埋单，而国家则在该项目遇到资金困难时充当担保人。加拿大压力集团“蓝色星球计划”负责人米拉·卡鲁纳南瑟将这称为“风险社会化、收益私有化”，企业从中榨取利润的同时却靠国家来承担金融风险。

基础设施投资在发展中国家的记录更加晦暗。尽管企业保证将带来亟需的投资，但大多数只会在风险更低的中等收入国家投资。研究者安东尼奥·埃斯塔切和马丁·罗西在2002年进行的一项研究发现，

大多数私有水务部门的投资都是在中国这样的中等收入国家进行的(50%)，而非在需求最大的低收入国家(18%)。

尽管发展中国家没有私营部门参与就没钱搞工程已经成为常识，但私营企业所依靠的投资来源和政府是一样的，包括捐助者、商业银行和开发银行等，这说明公共事业私有化背后的政治意愿和经济需求同样重要。正如公共服务国际研究小组的研究员戴维·霍尔所说：“当私营部门参与到水务系统中，它们获得的任何贷款都需要得到政府的担保，这样其信用评级和可行性就与国家的信用评级一样了。”

## 回归公共管理

关于私有化的问题公共舆论正在改变。英国压力集团“我们拥有它”的运动负责人艾伦·里斯指出，2018年是“20年来英国首次出现要求水务公有的运动”。列格坦研究所2017年进行的一项调查表明，83%的英国人倾向于水务国有化。荷兰的倡导组织“跨国研究所”发现，实行公共供水的城市水质更高、水价更低。它预测，全球已经有266个城市的水务系统重归市政系统。里斯说：“这是一个全球性趋势”，并说英国可能会“被落在后面”。

重归市政系统与国有化不同。后

者由集权国家统筹安排，前者一般则由地区或城市承担，水和卫生都属市政管辖。国有化带有一丝国家官僚气息，而再市政化则是将所有权移交给民主选举的地方当局。

这种市政所有权的参与方式还能扩大政治参与。2008年，苏伊士和威立雅将水务事业移交给公有的巴黎水务局，工会、环保活动者和租户协会都参加了董事会，会议也向大众开放。

其他城市也在努力争取之中。当市民平台“共同的巴塞罗那”集思广益，为2015年城市选举征集宣言时，水务的再市政化排名第一。倡导团体“你是生命”发现，阿格巴-苏伊士管理下的水费比周边公共管理的西班牙城镇高出91.7%。该市的水务已经成为一个政治战场，今年早些时候据说阿格巴-苏伊士集团雇佣间谍假装成活动者打入倡导团体内部。

但是公共部门失灵时怎么办的问题依然存在。比如，尼日利亚因泄漏和偷用损失了90%的供水。该国的拉各斯州很早之前就在计划卖掉水务系统，引发了当地非政府组织的愤怒。但是，戴维·霍尔认为更好的办法是消除腐败等公共部门失灵的根本原因。他说，让出售公用事业所得落入腐败政客们的口袋“非常不可能”改善拉各斯的境况。从其他地方水务私有化喜忧参半的结果来看，他可能是对的。⑤

在世界水周(8月26日—8月31日)之际，中外对话针对全球水危机及水资源管理发布系列文章，此文为第二篇。欢迎阅读第一篇《在天空中监测全球水资源》

赫蒂·奥布莱恩，为《雅各宾》、“城市实验室”、《伦敦书评》和“新社会主义者”等媒体撰写政治经济和城市方面的文章

# Is privatising water supply really the best solution?

Privatisation has failed to deliver, leading many cities to roll back corporate ownership

□ Hettie O'Brien



*Choppy waters: Privatisation remains controversial in England, where household bills have risen by 40% above inflation since 1989*

Water can seem endless: it covers 70% of the earth's surface, flows in rivers and falls from the sky. Yet climate change is making the world's water supply unreliable. As water scarcity grows, local campaigns across the globe are rolling back corporate ownership and challenging water privatisation, in a bid to regain control over our most vital resource.

Only 2.5% of the world's water is freshwater and safe for

consumption. Sources are often difficult to access; hidden in remote glaciers or deep underground. Climate change has brought droughts in some places and floods in others, making freshwater supplies more difficult to manage. Heatwaves have forced some cities to drill deeper for groundwater or desalinate sea water. In flooded regions, freshwater has increased, but heavier rainfall has made it more difficult to store.



“Only 2.5% of the world's water is freshwater and safe for consumption.”

As weather extremes bring new challenges for water management, industry and urbanisation are aggravating demand. The United Nations estimates that during the last century water use exceeded the rate of population growth. Agriculture now accounts for 70% of freshwater usage. With more people migrating to cities, existing infrastructure is creaking. Close to 27% of urban-dwellers in cities in the developing world lack access to piped water at home.

These global trends create regional problems. The number of people living in water stressed areas, where freshwater is limited during part or all of the year, is set to rise. Water inequalities often map onto existing social fractures, with poor infrastructure leaving urban peripheries disconnected, and scarcity kindling water-related conflicts. In these uncertain conditions, the question of who is best placed to manage water is crucial.

## The promise of privatisation

At the same time, scarcity has created opportunities for profit. Water and sanitation has become a thriving industry dominated by multinationals like Veolia and Suez.

Willem Buiters, chief economist at investment bank Citigroup, described water as an “asset class” whose importance will eventually outstrip oil, copper and precious metals. Most major banks now have investment funds specifically targeted at the water industry, writes activist Maude Barlow.

England was the first country to sell off its water system in 1989, but privatisation remains politically controversial. The process typically involves municipal authorities leasing water provision to private companies in a public-private partnership. As Eduardo Araral, a professor of water policy at the Lee Kuan

Yew School of Public Policy in Singapore writes, privatisation advocates argue this is worthwhile for two reasons.

First, the private sector delivers services more efficiently. In England, politicians expected market competition to hasten improvements to services and bring down costs. The second argument is fiscal. In the developing world, states struggle to raise finance for infrastructure projects, but ceding water provision to the private sector attracts inward investment.

From the 1990s onwards, the World Bank founded policies on this wisdom. In conjunction with the International Monetary Fund, it gave loans to developing countries on condition that they privatised utilities.

In countries such as Bolivia, the idea was that water privatisation would plug gaps left by the state. In the city of Cochabamba, for example, the World Bank wrote in 1999 that “poor governments are often too plagued by local corruption and too ill equipped” to manage their water supplies.

## Clear costs, few benefits

But evidence shows governments have been overly optimistic about the benefits of selling up. In England, the average household water bill has risen by 40% above inflation since privatisation in 1989. And in the majority of privatisation cases, companies still rely on public funds. A study by the Public Services International Research Unit found companies received nearly 500 million euros from the European Bank for Reconstruction and Development from 1991-2012.

Thames Water, the company responsible for London's water supply, embodies this reliance on public money. When asked to finance a new mega-sewer in 2012, the company claimed it was too burdened by debt to afford it, despite paying millions of pounds in dividends to shareholders and executives. Instead, consumers will pay for the new sewer through higher water bills, with the state acting as guarantor in case the project has financial difficulties.

Meera Karunanathan, director of Canadian pressure group the Blue Planet Project, calls this the “socialisation of risk and privatisation of profits”, where companies extract profits while relying on the state to shoulder financial risk.

Infrastructure investment has a murkier record in the developing world. Despite assurances that companies would bring much-needed investment, most have only been willing to invest in middle income countries where risks are lower. A study by researchers Antonio Estache and Martin Rossi in 2002 found the majority of investment in private water provision occurred in middle-income countries like China (50%), rather than low income countries (18%) where needs are greatest.

There is a perceived wisdom that developing countries can't finance projects without private sector involvement. However, private companies rely on the same sources of investment that are available to governments -- including donors, commercial and development banks -- suggesting that privatisation is as much about political desire as economic necessity.

As David Hall, a researcher at the Public Services International Research Unit puts it, "when the private sector moves into water systems any loans they take out have to be guaranteed by governments -- so the credit rating and viability is the same as the credit rating of the country".

## Back to public management

Public opinion about privatisation is shifting. Ellen Lees, head of campaigns at UK pressure group We Own It, notes that 2018 is "the first time there's been a campaign for publicly owned water in the UK in twenty years".

When surveyed by the Legatum Institute, an educational charity, in 2017, 83% of people in the UK were in favour of water nationalisation. The Transnational Institute, a campaigning organisation in the Netherlands, found that cities with public water supplies tend to enjoy increased quality and lower bills. It estimates that 266 cities globally have remunicipalised water systems.

"This is a global trend", Lees says, adding that England risks "being left behind".

Remunicipalisation differs from nationalisation. The latter is orchestrated by a centralised state, while the former is typically undertaken by regions or cities, with water and sanitation falling under municipal jurisdiction. Where nationalisation has a whiff of overweening state

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In England, the average household water bill has risen by 40% above inflation since privatisation in 1989.

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bureaucracy, remunicipalisation devolves ownership to democratically elected regional authorities.

This participation in municipal ownership can also lead to wider political involvement. In Paris, where Suez and Veolia transferred water services to the publicly owned Eau de Paris in 2008, trade unions, environmentalists and tenants associations are all represented at board level, and meetings are open to the general public.

Other municipalities are next.

When citizens platform Barcelona en Comú crowdsourced its manifesto for city elections in 2015, remunicipalising water came top of the list. Campaigning group Aiuga és Vida found water rates set by Agbar-Suez were 91.7% more expensive than those in neighbouring Spanish towns where water is publicly managed. The city's water has become a political battleground, with Agbar-Suez allegedly hiring spies to pose as activists and infiltrate water campaign groups earlier this year.

But there's still the question of what to do when the public sector fails. In Nigeria, for example, up to 90% of water is lost through leaks and theft. Lagos State has long planned to sell off water services, much to the anger of local NGOs. However, David Hall argues that tackling the underlying causes of public sector failure, such as corruption, is a better approach. Allowing corrupt politicians to pocket the sale of public utilities is "highly unlikely" to improve the situation of Lagos State, he says. Surveying the mixed legacy of water privatisation elsewhere, he may be right. ☺

*This article is the second in a three-part series examining water scarcity and water management in a global context to mark World Water Week 2018 (26th - 31st August).*

*Hettie O'Brien writes about political economies and cities for Jacobin, CityLab, the London Review of Books and New Socialist*

# 洋垃圾禁令是否真的环保？

洋垃圾禁令事实上大幅拉动了原生材料的需求，其环境影响或许比我们想象的更复杂。

□ 夏·洛婷



2018年5月，汕头海关查获的超过20万走私进入中国的违禁固体垃圾

**今**年年初中国限制进口国外垃圾之后，其原材料供应面临着数百万吨的缺口。

然而，泰国、印尼、马来西亚等周边国家非但没有被中国海岸警卫队拒绝的垃圾淹没，反而得益于越来越多价格低廉的可回收材料供应。

2016年7月，中国在世界贸易论坛上宣布将限制26种塑料和废纸的进口。乍一看，该决定似乎是一个有利于环境的消息。

最终西方国家将被迫停止向中国“倾倒垃圾”，对自己的垃圾负起责任。乐观主义者预计，美国和欧盟

的垃圾处理系统将会彻底变革——企业开始通过优化产品设计来减少供应链中的垃圾。

但实际上，垃圾出口大国们无论是硬件还是软件都没有做好应对这一变化的准备。装载着垃圾的集装箱改变路线，驶向其他缺乏垃圾



处理基础设施的发展中国家。与此同时，中国的制造商们已经开始适应。那么，禁令生效8个月后，效果如何呢？

亚当·明特是一名美国记者，著有《废物星球：穿行在价值数十亿美元的垃圾贸易中》(Junkyard Planet: Travels in the Billion-Dollar Trash Trade)一书。他曾在中国工作10多年，为彭博报道中国的回收业，后前往马来西亚。他认为，中国拒绝的不是无用的垃圾，而是本该供应给支撑该国经济的回收和制造部门的有价值的废料。

在亚当即将着手撰写新书之际，我们和他探讨了禁令的影响。为清楚起见，采访内容已经过编辑和浓缩。

**夏·洛婷(以下称“夏”)：**您认为中国的洋垃圾禁令对环境来说不一定是好消息。这是为什么？

**亚当·明特(以下称“亚当”)：**新的限令实际上是禁令，之所以这么说是从零和意义上讲的。禁止进口回收物不可能发生在真空中。如果你不使用回收材料（也就是中国禁止进口的），那就是迫使企业使用原材料。生产同等数量的回收材料所需的能量要远低于原材料。

就铝而言，使用废料可以节省90%的能量投入。到2020年，中国的禁令可能也会覆盖到铝废料，那你不仅要在西藏的地上挖个洞找铝，而且还要消耗和生产更多的碳。铝的能量密集程度非常高，塑料和纸张的碳排放虽比不上铝，但也很高。

中国对美国石油化工中心德克萨斯州生产的新塑料和液化天然气

兴趣日渐浓厚。为什么？因为（中国企业）进口回收物的库存吃紧。

去年12月我在成都参加一个纸张循环利用会议，有贸易协会直言不讳地说，他们的原材料至少存在500万吨的缺口。

如果回收物供应不足，那就得从别的地方找材料，可能是树，或者稻草，这对环境的破坏非常大。

围绕这一问题的整个对话都存在很多错误的信息，很片面。中国回收的根本不是废品，而是有利可图的再生材料。所有进口到中国的可回收废料，都会有人买。2002年起我就一直在报道这个问题，还没见过谁会花钱买一堆没用的垃圾的。

**夏：**转向初次原材料似乎与中国提高经济可持续性和能源效率的努力相悖。所以，之前预见到这个问题了吗？还是说这是为了推动加强生活垃圾处理的长期目标而必须付出的代价？

**亚当：**2000年代中期以来，中国政府对原材料行业的扶持力度超过了对回收业的支持，原因很明显，原材料行业和大型矿业以及钢铁公司都是国有实体，而回收业大部分是私营的，所以这其实是政策的延续。

每当政府想要管制钢铁生产，受打击的都是小城市里回收钢材的私营工厂，这是一个老问题。习近平任期内，国有企业得到的支持越来越多。

其次，我认为这背后还有民族主义情绪在。关于外国人“倾倒”垃圾的言辞真的会激起民众的情绪。现在中国官方正有意识地试图重振中国人的爱国热情和民族主义精神，民众对这洋垃圾的抵触情绪其实也该这么理解。

第三个问题是，中国确实希望国内城市开始回收垃圾，想要刺激国内的回收产业，但如果和国外进口的垃圾竞争，就没那么容易了。

中国政府会告诉你，这些洋垃圾都是高度污染的，这是一种夸张的说辞。事实上就当前来说，中国现在进口的废料是史上最干净的，一部分原因是因为2012年的严惩措施。

相比中国城市产生的可回收物，国外的回收物要好太多。中国城市没有分拣，没有单一或多种类的区分。所以，如果你是一个塑料或者废纸回收商，让你在进口还是国内回收物之间进行选择的话，那根本不用选，你肯定会多花点钱买国外的回收物，这才是真正的问题所在。

“围绕这一问题的整个对话都存在很多错误的信息，很片面。中国回收的根本不是废品，而是有利可图的再生材料。所有进口到中国的可回收废料，都会有人买。2002年起我就一直在报道这个问题，还没见过谁会花钱买一堆没用的垃圾的。”



**夏:** 您认为政府会愿意看着回收商破产, 以换取整体效率的提高吗?

**亚当:** 我认为他们不会深入思考这个问题。过去中国的回收业都是非常本地化的。我觉得除了北上广深, 各地回收业和中央政策关系不大。大家有一种很模糊的感觉, 认为这或许有助于中国国内回收业的长期发展。

**夏:** 有报道称限令生效(2018年1月1日)以来, 东南亚一直在收拾烂摊子, 都快被垃圾淹没了。但你认为禁令对这些经济体来说是好事。怎么解释?

**亚当:** 东南亚国家有劳动力, 有监管资源, 也渴望经济增长。如果你突然把成百上千吨原材料扔到一个国家, 那就不可避免地会看到经济体以此为基础增长起来。

马来西亚就在经历类似的情况。我们看到大量本应运往中国南部的有色金属回收物改变路线, 来到了马来西亚南部吉隆坡和柔佛的郊区。

进入越南的材料太多了, 政府因此设置了塑料进口的上限, 废纸进口也有了限额。

中期来看, 2到5年内, 你会看到那些曾经出口垃圾的发达地区开发出其他一些能力。

美国威斯康星州曾宣布投资5000万美元修建造纸厂, 回收利用

原本出口至中国的纸张。美国处理杂废纸的能力很小, 原因在于废纸运往中国的费用不高, 卖价还很可观。现在好了, 中国市场没了。这对威斯康星州而言是大好事, 但从某种意义上说是中国的损失。

**夏:** 现在很多人都强调吸管、塑料袋这种一次性塑料的问题, 但制造商说禁用塑料袋解决不了问题, 还可能造成更多污染。这怎么解决呢?

**亚当:** 如果目标是防止海洋塑料的积聚——我们都看过海龟的视频——那在发达国家禁止使用一次性塑料完全没用。詹娜·杰贝克的研究有一些关于海洋塑料来源非常有趣的数据点。

他们在研究中发现, 包括中国在内的8个亚洲国家造成了63%的海洋塑料垃圾, 而在美国, 大家都很关注塑料问题, 这一数字只有2%。美国少用一个塑料袋不会带来多大的影响。

解决这些问题更好的办法是真的去收集垃圾, 从而改善垃圾收集。很多沿海国家没有进行垃圾收集。第二步是改善垃圾掩埋、焚烧和回收过程。我认为针对某些物品的禁令只是隔靴搔痒, 在那些快速增长的经济体中是不现实的。这些经济体的塑料垃圾增长迅速, 他们也想有机会去使用塑料。

**夏:** 对塑料征税是另一种方法。在英国, 每个塑料袋征收5便士的税, 这一举措导致塑料袋的消费量下降了90%。消费者应该为奢侈的一次性生活方式买单吗?

**亚当:** 我不认为这个办法在发展中国家会特别有效。例如, 印尼已经讨论了很多年对一次性塑料和瓶子征税的问题。但如果你是普通消费者, 这就是一个可怕的主意, 因为大多数印尼人, 超过50%的人家里没有干净的水, 他们高度依赖瓶装水。

不管大家喜不喜欢听, 一次性塑料确实改善了发展中国家的生活。我认为, 在这些发展中国家成为发达国家之前, 我们最好给他们更好的垃圾管理方式, 而不是告诉他们“不, 这个你不能用”。

围绕塑料的对话大多过于关注塑料消费品。如果你看一下美国、加拿大和欧盟的数据, 所有固体废弃物中仅2%到9%, 也就是不到10%是由消费者制造的。其余都来自农业、水产养殖、制造业和配送。所以, 如果你真的想解决这个问题, 消费者方面自然是要看的, 但归根到底, 你还要追根溯源, 关注生产和供应链。🔄

夏·洛姆, 伦敦记者, 主要关注环境问题

# China's waste ban debate is 'misinformed' and 'one-dimensional'

Adam Minter says limits on foreign 'trash' have created a multimillion tonne shortfall in raw materials

□ Charlotte Middlehurst

China faces a shortfall of millions of tonnes of raw materials after placing restrictions on foreign waste imports at the start of this year.

But rather than drown in rubbish rejected by China's port authorities, neighbouring countries in the region – such as Thailand, Indonesia and Malaysia – could in fact be benefiting from the increased availability of cheap recyclable materials.

At first glance, China's decision to restrict imports of 26 types of foreign plastic and paper seemed like a boon for the environment, when announced at a World Trade Forum in July 2016.

Finally, Western countries would be forced to stop “dumping” on China, said the press, and take responsibility for their own rubbish. Optimists predicted an overhaul of waste disposal systems. In the United States and Europe

companies promised to “design” waste out of their supply chains.

But in reality the big waste exporters were ill-equipped to respond to the change. Rubbish containers were rerouted to poorer neighbouring countries that lack the infrastructure to process it, while Chinese manufacturers have relocated. So, eight months after the restrictions came into force what has been the effect?

Adam Minter is an American journalist and author of *Junkyard Planet: Travels in the Billion-Dollar Trash Trade*. He was based in China for over a decade, reporting on recycling for Bloomberg, before moving to Malaysia. He argues that China has not been turning away useless junk but instead valuable scrap, which supplies the recycling and manufacturing sectors that underpin the country's economy.

The interview has been edited and condensed for clarity.

“At first glance, China's decision to restrict imports of 26 types of foreign plastic and paper seemed like a boon for the environment.”

“Foreign recycling is immaculate compared to what is being generated in Chinese cities.”

**Charlotte Middlehurst:** You argue that China's ban on foreign waste might not be good news for the environment. How so?

**Adam Minter::** The new restrictions, which are effectively bans, are spoken of in a zero-sum sense. Banning an import of recyclables is not something that occurs in a vacuum. If you're not using recyclable raw materials (and that's what China has banned) you force companies to use virgin materials. It requires far less energy to produce an equal volume of recycled material than a virgin one.

In aluminium, you're talking about a 90% energy input saving. In 2020 we're likely going to see China's ban hit aluminium scrap as well, so not only are you digging a hole in the ground in Tibet to get that material out, you're also consuming and producing more carbon. The carbon emissions for plastics and paper aren't as significant as they are for aluminium because aluminium is so energy intensive. But they're still significant.

There's been a huge uptick in Chinese interest in virgin plastics, and liquefied natural gas produced in Houston, Texas, the petrol chemical capital of the US. Why? Because [Chinese companies] can't get the imported recyclables in stock.

I was in Chengdu in December at a paper recycling conference where a trade association candidly said that they're facing a shortfall of at least 5 million metric tonnes in raw materials.

If they can't get any recyclables then they're going to get it elsewhere, and that could be from trees, or from straw, which is very environmentally destructive.

The overall dialogue around this has been really misinformed and one-dimensional. Recycling in China

has never been about dumping. Someone pays for every scrap of recycling that gets imported into China. I've been covering this since 2002 and I'm yet to meet someone who pays for a pile of garbage.

**Charlotte:** Turning to virgin raw materials seems to clash with China's efforts to move towards a sustainable and energy efficiency economy. So, was this foreseen and is this a price worth paying to advance a longer-term ambition to improve domestic waste processing?

**Adam::** Since the mid-2000s China's government has tended to favour the virgin materials industry more than the recycling industry, and for an obvious reason. The virgin materials industry and the big mining and steel companies are state-owned entities, and the recycling industry is largely private. So, this is really a continuation of that policy.

Whenever the government wants to crack down on steel production, they do so on the private mills in smaller cities in China that are recycling steel, and that's been a long-term problem. Under Xi Jinping, the state-owned enterprises are increasingly favoured.

Second, I think there's nationalist sentiment behind this. Rhetoric surrounding foreigners 'dumping' waste really can inflame passions.

The third issue at stake is that China really does want to see its cities start recycling. It wants to spur a domestic recycling industry, which isn't so easy when you're competing against foreign imports.

The Chinese government will tell you that foreign imports are seriously contaminated. That's an exaggeration. Actually at this point in 2018 China's imports have never been cleaner, and that's partly due to crackdowns leading back to 2012.

Foreign recycling is immaculate compared to what is being generated in Chinese cities.

**Charlotte:** Since the restrictions came into force (on January 1, 2018) it has been reported that Southeast Asia has been picking up the slack and is overwhelmed

**with waste. But you've written that the ban is good news for these economies. Why?**

**Adam::** Countries in Southeast Asia have labour and regulatory resources and a desire to grow economically. If you're suddenly dumping hundreds of thousands of tonnes of raw materials into a country, inevitably you're going to see economies grow up around that.

Some of that is happening right now in Malaysia. We've seen a huge percentage of southern China non-ferrous metal recycling relocate in areas outside of Kuala Lumpur and Johor in southern Malaysia.

In the mid-term, 2-5 years, you're going to see some other capacities grow up in these developed regions that were exporting before. There was an announcement of a half-billion dollar paper mill in Wisconsin designed to take the kind of paper that was being exported to China. The US has only had small capacities for mixed paper because it was so cheap to ship paper to China, the prices were good. Well, now that market is gone. So that'll be really good for Wisconsin and in a sense it'll be China's loss.

**Charlotte: There's been a lot of emphasis on single use plastics like straws and plastic bags. But manufacturers are saying banning the bags won't fix the problem and could lead to more pollution. What's the solution?**

**Adam::** If the goal is to prevent the accumulation of ocean plastics – and we've all seen the videos of that turtle – then banning single use plastics in developed countries will make absolutely no difference. The standard Jenna Jambeck study has some really interesting data points on the sources of ocean plastic.

In the study they found that eight Asian countries, including China, account for 63% of ocean plastics. Whereas in the US, where we get all this attention, it's just 2%. A ban in the United States is not going to make a bit of difference.

The much better solution to these problems is to improve trash collection by actually collecting the trash. So many coastal countries just don't have trash collection. Step two is improving the landfill, incinerators and the recycling process. I think banning items is just a distraction and it's not realistic in fast-growing economies where you have fast-growing plastic waste, and where they want their chance to consume.

**Charlotte: Taxing plastics is the other approach. In the UK a 5p tax on plastic bags has led to a 90% fall in consumer usage. Should consumers pay for the luxury of a disposable lifestyle?**

**Adam:** I don't think it works especially well in developing countries. For example, in Indonesia, there's been talk for several years of a single use plastic tax and taxes on bottles. But if you're an average consumer it's a terrible idea because most Indonesians, well over 50%, don't have access to clean water in their homes. They're highly dependent on bottled water.

Whether people like to hear it or not, single use plastics improve lives in developing nations, and until those developing nations are developed nations, I think we'd all be better served by giving them better waste management than telling them 'no, you can't have it'. 🌀

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



# 化学回收技术能解决塑料危机吗？

用化学方法将废塑料变回石油正在成为具有可行性的选项。

□ 凯瑟琳·厄尔利



回收技术公司表示，其设备可以将难以回收的塑料材料转化为石油

**全**世界每年生产塑料4亿吨，但只有10%得到了回收利用。塑料每年对世界海洋生态系统造成的经济损失至少达130亿美元（890亿元人民币）。有关塑料环境影响的

数据正在以惊人的速度增加，丝毫不逊于塑料垃圾增加的速度。

虽然有必要增加循环利用率，但并非所有常用的塑料都能被加工。这意味着即使所有的消费者和企业

都回收了他们所能回收的所有塑料，仍然会有很大一部分变为垃圾。

大多数可回收的塑料经机械加工分解成颗粒，然后重新制造成新的塑料产品，例如包装材料，座椅或

衣物(聚酯)。然而,该工艺不适用于塑料薄膜、小袋和其他层压塑料,通常这些材料会被送到垃圾填埋场或进行焚烧。

那么该如何处理这些占总量近40%的难以回收的塑料呢?办法之一就是化学回收。这种方法可以去除制造过程中添加的化学物质和其他成分,将塑料变回纯质油。

## 油与塑料间的循环往复

化学回收方法并不新鲜,但到目前为止无人开发出成功的商业模式,将大量小而轻的塑料垃圾(如薄膜等)运输到集中处理厂。由于原材料价格很低,所以建立必要的回收网络动力不足。

一家英国公司称其找到了解决办法。总部位于该国西南部斯温顿的“回收技术公司”表示,其生产的RT7000设备可以安装在现有的垃圾处理厂中,将难以回收的塑料材料转化为石油。该产品名为Plaxx,可以替代化石燃料中提取的油,用于生产新的聚合物和合成蜡。

该公司还称该工艺可以减少碳排放——与垃圾处理厂焚烧能耗相比,用该公司的机器处理一吨塑料将减少1.8吨二氧化碳排放。

“回收技术公司”正在斯温顿筹建装配厂,每年生产200台机器,以满足预期的塑料回收需求。该公司表示,机器可在三年内回本,并可装入集装箱,以便运输到垃圾处理厂,从源头进行塑料回收。相比于将塑料运输到大型集约化处理站,将设备运输到各个废品处理厂的卡车往返次数减少了六分之五。

该公司还在苏格兰的Project

“  
化学回收得到的原料也可用作船运燃料。根据苏格兰零废弃物组织的说法,Plaxx塑料材料转化成的石油在燃烧时产生的二氧化硫(SO<sub>2</sub>)远远少于重质燃料油。  
”

Beacon回收创新中心安装了一台机器。在苏格兰政府和欧洲区域发展基金的支持下,该项目将同时采用多项最先进的回收技术,建立一个能够让家庭回收全部塑料的示范系统。

该公司将在英国和北欧安装的首批12台机器已成功获得了6500万英镑(5.8亿元人民币)的Plaxx销售合同。该公司还与专门从事石油和石化领域运输、储存和混合的全球商品贸易商——英腾化工(InterChem)建立了商业联盟。

该公司还向欧洲蜡制造商Kerax预售了价值1500万英镑(1.34亿元人民币)的蜡材料。蜡可以用于制造全天候防水界面材料、蜡烛和凡士林等化妆品,但全球供应短缺。“回收技术公司”销售和营销总监鲁珀特·霍沃思解释说,蜡通常源自炼油产生的副产品,但现代炼油厂已不再产生此类产品。

“未来几年,传统蜡的供应量将急剧下降。从可再生塑料中获取蜡是一项重大创新,完全符合我们供应来源多样化的目标。”Kerax首席执行官伊恩·阿普尔顿说。

## 全球性问题的解决办法

为缓解世界塑料污染问题,必须扩大这项技术的使用。“回收技术公司”的目标是到2027年在全球安装1700台机器,年塑料回收能力有望达到1000万吨。

“向我们打听这项技术的公司几乎遍及世界各个角落,因为这是一个世界性的问题。”霍沃思称。公司计划建立、拥有和运营首批设备,然后再扩大规模。“当人们了解了这项技术并接受了它,我们就可以开始销售了。”他说。

食品和饮料制造商也有化学回收产品的需求。其中许多企业通过“废弃物与资源行动计划”(WRAP)组织领导的英国塑料协议等倡议,承诺采取行动,解决塑料包装问题。

签署该协议的企业所使用的塑料包装占英国超市所售产品塑料包装总量的80%以上,其中包括阿斯达、可口可乐、联合利华和乐购。

除了杜绝不必要的塑料包装外,这些企业还承诺100%实现塑料包装可重复使用或可回收利用,且所有塑料包装中再生成分占到30%。

目前,人们担心满足这些举措会导致材料供不应求。根据规定,欧盟范围内使用的食品和饮料包装必须通过欧洲食品安全局制定的严格安全测试,并且由于机械回收工艺通常无法去除塑料原本用途生产过程中所使用的化学品和重金属,所以大多数经机械回收的塑料都不能用于食品饮料包装。

英国塑料联合会可持续发展问题执行官海伦·乔丹说:“很多公司都承诺包装中含有一定比例的再生成分。这些成分要有供给来源,而且

是能和食物接触的材料。人们对身边是否有充足的供给来源存有疑问，若是通过化学回收方式得到这些材料，将是一件好事。”

如今有计划通过艾伦·麦克阿瑟基金会的新塑料经济项目在全球范围内推广“废弃物与资源行动计划”，这将进一步扩大 Plaxx 等食品级包装产品的需求。

Recoup 首席执行官斯图尔特·福斯特说，“回收技术公司”开发的技术和商业模式在非洲和亚洲国家极具潜力，因为这些地区是塑料进入土壤或海洋的重灾区。“这样做会使低规格的塑料得到回收利用。因此，若在这些地区使用这种技术，就相当于遏制了全球塑料污染问题。”

福斯特补充道：“使用塑料包装益处良多，所以最好的解决方案就是，如果我们能找到合理的处理方式，就可以继续使用塑料。我们听说过无塑料产品等，但如果塑料是保持新鲜的最佳产品，那么最理想的方式就是继续使用塑料，但是要有相应的这些解决方案。”

化学回收得到的原料也可用作船运燃料。根据苏格兰零废弃物组织的说法，Plaxx 在燃烧时产生的二氧化硫（SO<sub>2</sub>）远远少于重质燃料油，前者排放量为 0.09-0.5kg，而后者为 20.5kg。

有人可能会质疑燃烧这种物质的可持续性，是否会产生更多的污染，最终导致资源的流失。然而，福

斯特坚持认为，短期内最重要的是要阻止废弃塑料排放到环境、以及进入人类和野生动物的饮食中。

“可能某些用途比其他用途更具可持续性。但我们现在无需担忧，因为只要我们能够阻止塑料进入自然环境并在某种程度上对其进行循环利用，那么，未来的情况就比现在更好。”他说。☺

凯瑟琳·厄尔利，自由撰稿记者，《环境学家》前副主编

# Chemical recycling is coming of age

Some plastics cannot be recycled yet, but turning them back to oil could help solve the problem

□ Catherine Early

The world produces 400 million tonnes of plastic every year but only 10% is recycled. Much of it seeps in to the ocean, causing at least US\$13 billion (89 billion yuan) worth of economic damage to marine ecosystems annually. Alarming statistics on the impact of plastics on our environment are piling up almost as fast as the material itself.

A transformation of our global recycling system is needed, however, not all regularly used plastics can be processed. This means that even if all consumers and businesses recycled everything they could, a large proportion would still go to waste.

The majority of plastics that do get recycled undergo a mechanical process that breaks them down into pellets. They're then reused in the manufacture of new

plastic products, such as packaging, seats or in clothing (polyesters). However, this process cannot be used on plastic film, pouches and other laminated plastics, and these materials are typically sent to landfill or incinerated.

What can be done with all these hard-to-recycle plastics, which account for around 40% of the total? One answer is chemical recycling. This can be used to turn plastic back into pure oil, removing the chemicals and other substances added to it during manufacturing.

## From oil to plastic and back again

Chemical recycling isn't new, but so far no-one has managed to develop a successful business model for transporting lots of small, lightweight plastic waste such as film to a centralised processing plant. Virgin material is cheap, so there has been little incentive to set up the necessary networks.

A UK company believes it has the answer. Recycling Technologies, based in Swindon in the south-west, says its RT7000 machine can be installed in existing waste plants where it can turn hard-to-recycle materials into oil. This

“We've had inquiries from literally every corner of the globe because this is a world-wide problem.

— Haworth”





*Recycling Technologies is setting up an assembly facility in Swindon to build up to 200 machines per year to meet anticipated demand for plastic recycling*

product, which it calls Plaxx, replaces fossil-fuel derived oils in the production of new polymers and synthetic waxes.

The company also claims the process cuts carbon emissions – each tonne of plastic treated in the firm's machines will save 1.8 tonnes of CO<sub>2</sub> – compared with incinerating it in an energy-from-waste plant.

Recycling Technologies is setting up an assembly facility in Swindon to build up to 200 machines per year to meet anticipated demand for plastic recycling. The company says each machine can pay for itself in three years. It can also fit into a shipping container, so it can be easily transported to waste processing plants. Transporting the equipment to the site reduces the number of lorry trips required to move the plastic to a central site by a factor of 6:1.

It is also installing a machine at a recycling innovation hub in Scotland called Project Beacon. Backed by the Scottish government and European Regional Development Fund, the project will demonstrate technologies that will

enable households to recycle all plastics in the future.

The firm has already secured £65 million (580 million yuan) in sales contracts for Plaxx from the first 12 machines that will be installed in the UK and Northern Europe. It has signed a business alliance with InterChem, a global commodities trader that specialises in shipping, storage and blending in the petroleum and petrochemical industry.

It has also forward sold £15 million (134 million yuan) of the wax it will produce to Kerax, a European wax manufacturer. Wax is used in the manufacture of waterproofing, all weather surfaces, candles and toiletries (such as petroleum creams) but there is a global shortage. It was typically sourced as a by-product of oil refining, but modern refineries do not produce any, explains Rupert Haworth sales and marketing director at Recycling Technologies.

“The supply of traditional waxes is set to decline sharply in the coming years. To have a source of wax from recycled

plastic is a major innovation that fits in perfectly with our aim of supply source diversity,” says Ian Appleton, chief executive of Kerax.

### Fixing a global problem

In order to make a dent in the world’s plastic pollution problem, use of the technology will have to be scaled up. Recycling Technologies is aiming to have 1,700 machines installed globally by 2027, which will have the potential to recycle 10 million tonnes of plastic each year.

“We’ve had inquiries from literally every corner of the globe because this is a world-wide problem,” says Haworth. It plans to build, own and operate the first few machines itself, then scale up. “As soon as people get to know the technology and accept it, we will sell the units,” he says.

Demand for the output of chemical recycling is also coming from food and drinks manufacturers. Many of these have committed to action on plastic packaging through initiatives such as the UK’s Plastic Pact, run by waste advisory organisation WRAP.

Signatories to the pact include brands that are responsible for more than 80% of the plastic packaging on products sold through UK supermarkets, including Asda, Coca-Cola, Unilever and Tesco.

Alongside eliminating unnecessary plastic packaging, companies have pledged to make 100% of plastics packaging reusable or recyclable, and to use 30% recycled content across all plastic packaging.

Currently, there are concerns that there will not be enough supply to feed the demand created by such initiatives. Food and drink packaging for use in the EU is required to pass strict safety tests set by the European Food Safety Authority, and most of the plastics produced by mechanical recycling cannot be used, as the process does not typically remove substances such as chemicals and heavy metals that were used in the manufacture of the plastics’ original use.

Helen Jordan, sustainability issues executive at trade body the British Plastics Federation, says: “There have been a lot of companies committing to a certain amount of recycled content in packaging. That has to come from

somewhere, and they need material that can come in contact with food. There was concern about whether there would be enough of this around, so if chemical recycling can provide another source of that, it would be great.”

There are plans to replicate the pact globally through Ellen MacArthur Foundation’s New Plastics Economy, which will further boost the demand for products such as Plaxx that can be used for food-grade packaging.

Stuart Foster, chief executive of Recoup, says that the technology and business model being developed by Recycling Technologies both have potential in African and Asian countries where most of the leakage into soils and the ocean occurs.

“It would allow for lower-spec plastics to be recycled so if you can use it in those places it could be used to stop global plastic pollution,” he says.

Foster adds: “There are benefits to using plastic in packaging, so the best solution would be to keep the material if we can find sensible things to do with it. We hear about plastic free and so on, but if it is the best product to keep things fresh, then the utopia is to keep the material, but have these solutions in place.”

The feedstock produced from chemical recycling can also be used as a shipping fuel. Plaxx produces far less sulphur dioxide (SO<sub>2</sub>) than heavy fuel oil when burnt, with emissions of 0.09-0.5kg of SO<sub>2</sub> compared with 20.5kg SO<sub>2</sub>, according to Scottish organisation Zero Waste Scotland.

Some might question the sustainability of burning it, which creates more pollution and ultimately means the resource is lost. However, Foster insists that, in the short-term, the most important thing is to stop waste plastic leaking into the environment, and human and wildlife food and drink streams.

“Possibly some uses are more sustainable than others. But we shouldn’t worry about that at the moment because as long as we can stop the leakage and get some kind of reuse, we’ll be infinitely better than we are now,” he says. ☺

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

# 公海保护大谈判： 难在何处？

保护公海生物多样性的政府间谈判即将启动，  
海洋治理机制的大变局或将到来。

□ 张 春

**继**气候变化、移民问题之后，又一个挑战国际关系和民族国家体制的议题正在浮出水面，这就是公海保护。

所谓公海，就是不属于任何国家的海域。公海和对应的海床部分，统称为国家管辖范围外的区域，而这片广袤的无主之地，是全球 90% 海洋生物的家。

但是，对公海肆无忌惮并且越来越具有风险的攫取，正在威胁这个庞大的生态系统。例如，在公海盛行的非法、不报告和不管制(IUU) 捕捞活动，就是过去 50 年海洋中一半的鱼类消失的重要原因之一。

今年 9 月 4 日在纽约的联合国总部，一场旨在保护人类共有的国际海域生物资源的谈判展开。接下来的两年，全球各国政府将努力达成一份具有法律约束力的协议，来保护公海免于过度开发。



根据《联合国海洋法公约》，人类可以在公海自由捕捞，航行

## 无主之地

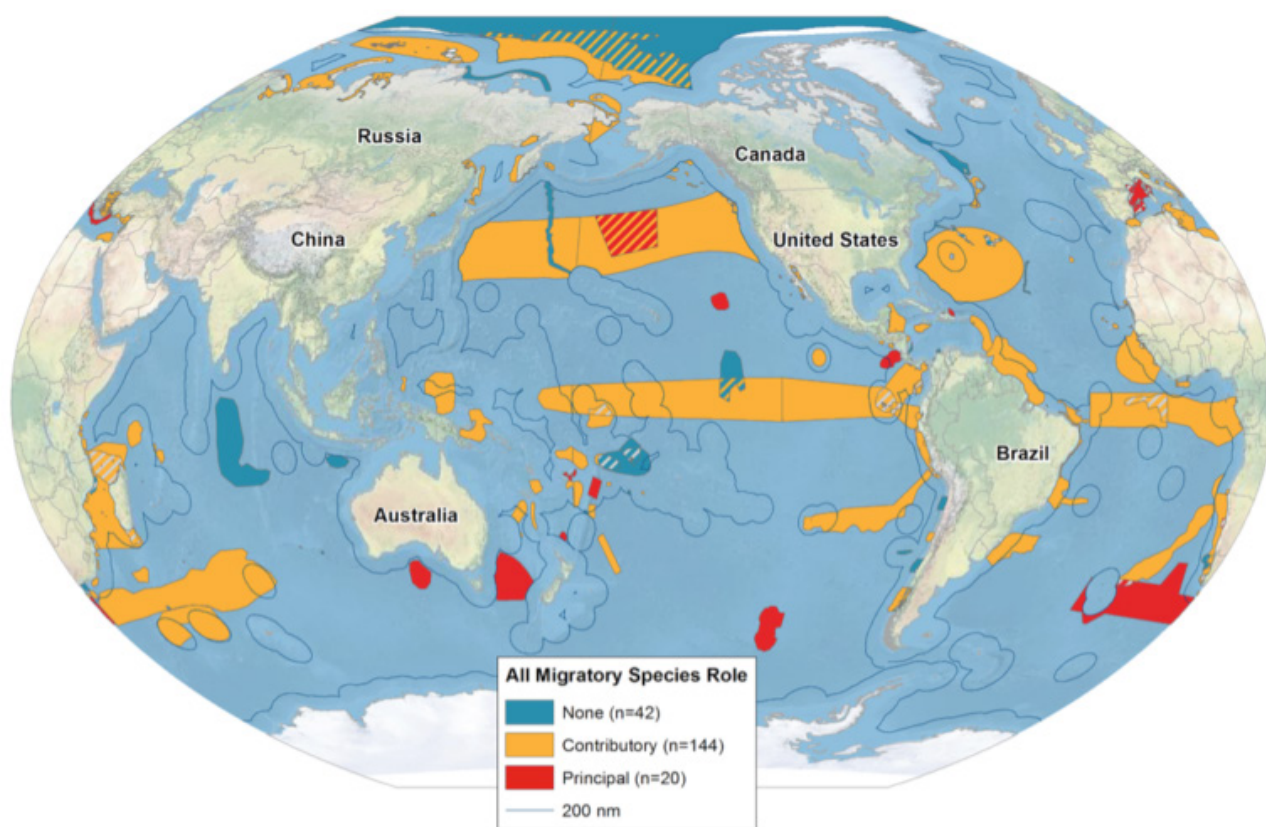
根据《联合国海洋法公约》，人类可以在公海自由捕捞，航行，铺设电缆等。现在，技术进步又赋予了人类在公海的另一种“自由”，即海底采矿。目前包括中国、韩国、日本、德国等十多个国家已经在大西

洋、太平洋和印度洋水域勘探金属矿产。

但是，目前还没有法律要求开发者必须提交评估勘探影响的环评报告，也没有一个国际法规来统一管理公海上的航行、捕捞等活动。

联合国海洋法公约之下成立了近 20 个国际组织来管理这些人类活





Duke University Marine Geospatial Ecology Lab

根据杜克大学教授Patrick Halpin的研究，全球的重要的生态和生物多样性区域有近10%完全在公共海域，超过20%的区域部分位于国际海域。图中红色（10%）为迁徙物种最重要的栖息地或补给站；黄色区域（70%）为迁徙物种有关的区域；深蓝色为无关区域。

动，但是一些组织只管自己部门的事，如国际海事组织（IMO）管理船舶航行安全和防治海上污染；还有一些组织不仅有自己特定的对象，还局限于一定区域，如区域渔业组织（RFMO）只管理特定鱼群。

然而，很多海洋生物具有迁徙或洄游特性，它们的一生需要多次往返散布于海洋中的多个生境。然而，根据不同的测算方法，目前全球海洋受到保护的仅在2%到7%之间，公海中受到保护的更是不足1%。

早在2014年，全球海洋委员会的一份报告就重申了保护的困境：“《联合国海洋法公约》在实践中缺乏快速应对新挑战的能力，更无法加强管理以保护公海生物多样性、

生态系统和渔业资源所面临的日益加剧的威胁和危险。”

资深环境律师Duncan Currie在形容我们当前的公海保护工作时有一个形象的说法：“我们的战场其实是支离破碎的。”

为公海的可持续利用建立新的国际协商机制因而刻不容缓。

## 谈判目标： 利益共享，责任共担

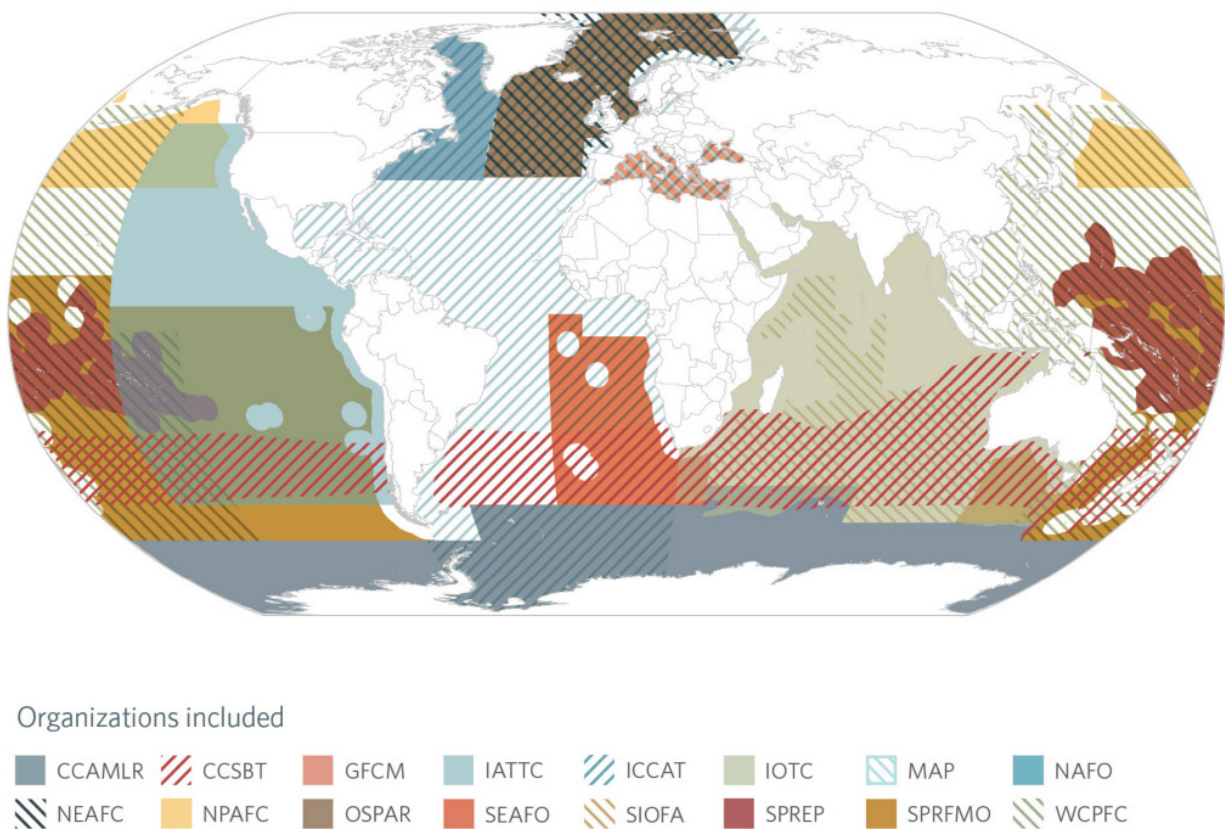
9月4日正式开始的关于公海的谈判，其最终目标是保证在公海范围内，各国既有公平享有国际海域的资源和收益，又能够共同保护海洋环境的可持续发展。

为了实现这一愿景，谈判将重点围绕四个目标。第一个目标，是建立国家管辖外区域（ABNJ）开发的环评制度。不过，如何将在陆地上一概由地方政府监管的环评机制应用于国家疆域之外的公海，环评由谁来做，谁来监管，还有待在后续讨论中确定。

谈判的另外三项内容，是建立海洋基因资源惠益共享机制，对发展中国家的能力建设和技术转让，以及建立基于区域的保护机制。

不过，建立保护区、强制要求进行开发环评等，与联合国海洋法公约赋予的公海“自由”相冲突。这场谈判因而意味着对公约的补充、完善或调整，也被认为是《联合国海洋法公





图例：CCAMLR—南极海洋生物委员会，CCSBT—南方蓝鳍金枪鱼保护委员会，GFCM—地中海渔业总委员会，IATTC—美洲热带金枪鱼委员会，ICCAT—大西洋金枪鱼国际委员会，IOTC—印度洋金枪鱼委员会，NAFO—西北大西洋渔业组织，NEAFC—东北大西洋渔业委员会，NPAFC—北太平洋溯河鱼类委员会，OSPAR—东北大西洋环境保护公约，SEAFO—东南大西洋渔业组织，SIOFA—南印度洋渔业协定，SPREP—南太平洋区域环境保护公约，SPRFMO—南太平洋区域渔业管理组织，WCPFC—中西太平洋渔业委员会。

地图显示了公海领域所有的国际组织，但全球范围的国际组织除外，例如国际捕鲸委员会（IWC），国际海事组织（IMO）和国际海底管理局（ISA）。这些组织几乎涵盖了所有公海区域，且在许多区域相互重叠。尽管有许多组织管理同一地区，但很少有机制来促进或协调各组织间的活动。

约》生效（1994 年）以来最重要的国际海洋法律制度形成过程。

## 两大难题

上海交通大学的极地和海洋治理专家薛桂芳教授认为谈判面临着两大难题。一是理念，二是利益。

“国际海洋法资深的学者，普遍有很传统的海洋自由的概念，因此讨论起来会有很大的阻力，”薛桂芳表示。她坦言，公海生物多样性的讨论，一些代表团专家从理念上就无法接受。

这种理念的挑战也体现在谈判进程的蹉跎上：对于保护“国际海域生物多样性”，全球早已达成一致，2004 年的联合国大会就决定成立该议题的研究小组。但直到 2017 年，各国才最终同意正式坐下来商量具体操作。

就连这次谈判所用的文本草案的准备过程，也展现出旧观念的束缚。一方面，准备草案的预备会议的原则是不损害现有有关法律文件和框架以及相关的全球、区域和部门机构，但事实上，不限制公约赋予的自由就不可能完成目标。

另一方面，即便理念统一了，利益分配也不会轻易达成。中国大洋矿产资源研究开发协会办公室副主任胡学东曾撰文指出，在公海生物多样性的谈判中欧盟和美日俄就形成了对立阵营。

以公海开发环评为例，欧盟要求进行严格的第三方环评，确保在充分了解风险的情况下再开采，这种环评的成本和难度都非常高，现有科学技术也可能无法完成；美日俄就提议基于“最先进科学技术”评估，等同于就能力范围内可以了解的风险进行评估，并且拒绝第三方环评。

同样，公海谈判的另一个目标，即建立大规模的海洋保护区体系，同样将限制现在普遍享有的公海捕捞和开发的利益。2011 年提议建立的南极罗斯海保护区，就直到 2016 年 10 月底才最终通过，并且保护面积比最初提议少了三分之一。

因此，薛桂芳认为，“趋势是明显的，这个东西（最终协议）肯定会出来。但两年太乐观了，可能会是三五年或更长。因为里面每一个议题（的讨论）都会很慢。”

### 中国的微妙角色

国家管辖区域外的生物多样性（简称 BBNJ）的谈判，将会打破现有的海洋管理秩序。与强烈反对的俄

罗斯和有明显抵触情绪的日本不同，站在发展中国家阵营的中国，位置比较微妙。

绿色和平气候与海洋资深顾问李硕认为，中国需要为发展中国家争取“惠益分享”；但是作为海洋科学和技术已经取得长足进步并受益于此的国家，也不能无限制让渡自己的利益。

无论是规模位居首位的远洋捕捞船队，还是深入南北极和大洋深处的科考队伍，以及海底矿产勘探队伍，凭借经济发展的支撑，中国在全球大洋开发和研究中的分量在逐渐提升。

“全球像中国这样尴尬的角色并不多。”李硕说。

今年包括中国国企在内的全球五个最主要的磷虾捕捞企业宣布停

止在南极半岛敏感区域的捕捞，以及中国和欧盟建立“蓝色伙伴关系”，都引起了全球关注。中国一直站在反对建立南极保护区的阵营，这些微小的动作，让大家不禁猜测中国的立场变化。

在利益博弈之外，科学界对一个国际海洋事务参与度更高、科研实力增强的中国，在更深入了解海洋的全球科学研究中的期待也更高。

Patrick Halpin 就希望中国“评估一下自己在整个全球海洋迁徙物种迁徙连接中扮演的角色，充分参与到保护进程中来。”

张春，中外对话高级研究员

# Negotiations start on a high seas treaty

UN summit will discuss how to protect the open ocean, where 90% of marine life dwells

□ Zhang Chun

The high seas cover two thirds of the ocean and are home to 90% of marine life, but this vast expanse of water and seabed that lies beyond the national jurisdiction of any one country has no comprehensive protection.

In an effort to fix this, countries are meeting at the United Nations (UN) headquarters in New York until 18 September, marking the start of a two-year process to agree a treaty to protect the high seas.

This is needed because unrestrained and increasingly risky exploitation of resources threatens these huge ecosystems. Fish populations, for example, have declined by 50% over the past 50 years as a result of overfishing and illegal, unreported and unregulated (IUU) fishing.

“A binding agreement on protecting the high seas would be the most important piece of marine legislation since UNCLOS in 1994.”

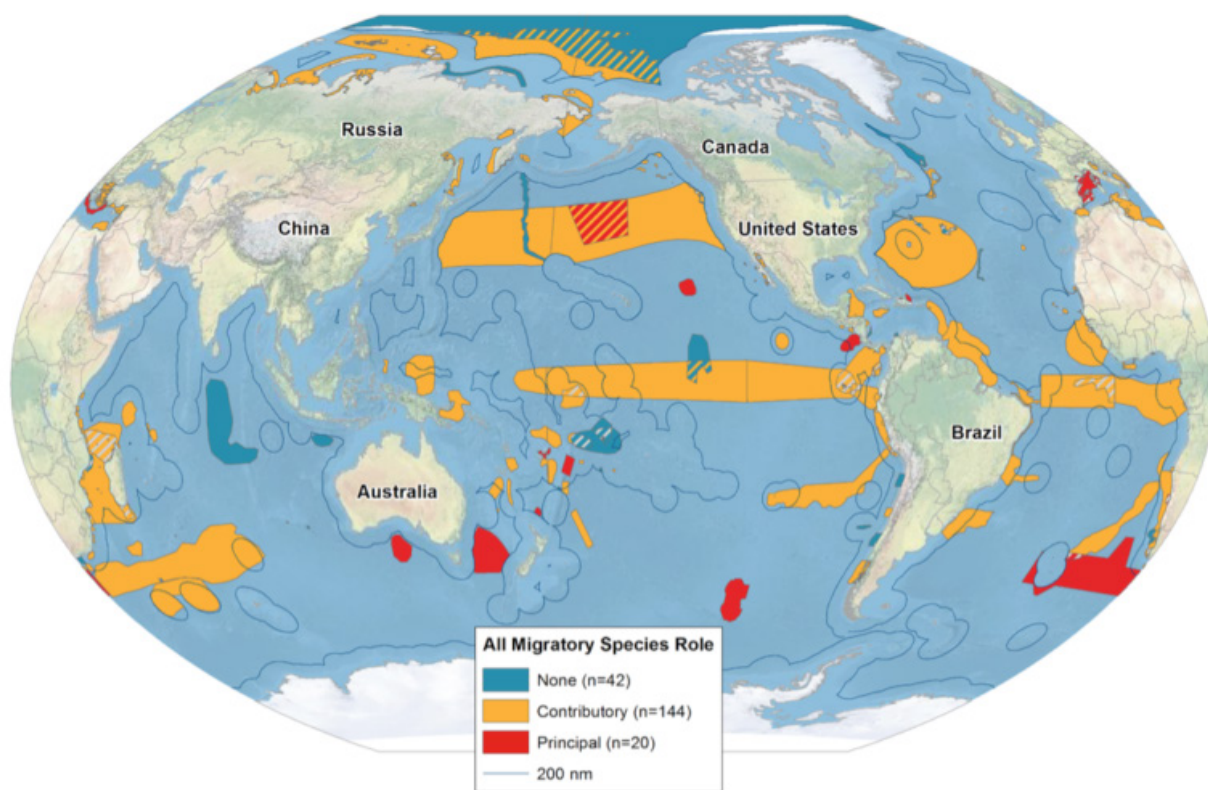
## No man's sea

The UN Convention on the Law of the Sea (UNCLOS) guarantees countries the freedom to fish, travel and lay cables in the high seas. It also defines the responsibilities of nations with respect to their use of the ocean, establishing guidelines for businesses, environmental protection, and the management of natural resources.

But technological advances are opening up the seabed to another freedom: extraction of mineral resources. Over ten countries, including China, Korea, Japan and Germany, are currently prospecting for mineral resources in the Atlantic, Pacific and Indian oceans.

The minerals and rare earth metals they gather are valuable components in everyday items like electrical wiring to more complex industrial machinery, and even renewable energy components.

At the moment there is no requirement for operators to submit an environmental impact assessment before starting deep-sea mining, and no overarching agreement to protect biodiversity on the high seas.



Duke University Marine Geospatial Ecology Lab

Map Key: Red: 10% of concentrated biodiversity (the most important habitats and feeding grounds for migratory species), Yellow: 70% of biodiversity (areas of importance for migratory species), Deep blue: areas not important for migratory species.

Under UNCLOS, almost 20 international organisations manage human activities on the high seas, but they are restricted in their scope. For example, the International Maritime Organization manages safety and prevention of pollution in the shipping sector, whereas regional fisheries management organisations oversee specific fish populations. But many forms of marine life are migratory and frequently move between different habitats.

Depending on the method of calculation used, only 2-7% of the ocean is protected – and less than 1% of the high seas.

“Our battlefield is very fragmented,” says Duncan Currie, a marine law specialist and advisor for the High Seas Alliance and Deep Sea Ocean Coalition, describing the challenge of high seas conservation.

There is an urgent need for a new international consultation mechanism for the sustainable exploitation of resources in the high seas.

## Sharing the benefits and responsibilities

The goal for the talks is to ensure that nations can share equally in the benefits and resources offered by the high seas, and can work together to ensure sustainable development of the marine environment.

To achieve this, the talks have four aims. The first is an environmental impact assessment system for areas beyond national jurisdiction. Countries must decide how to apply existing environmental impact assessment systems, which are usually operated on land by local governments, to international waters.

The other aims are to establish a system for sharing the benefits of marine genetic resources; to build capacity and transfer technology for developing nations; and to establish regional conservation mechanisms.

But setting up reserves and requiring environmental



impact assessments would place limits on the freedom of the seas enshrined in UNCLOS, meaning it would require an adjustment. This is why a binding agreement on protecting the high seas is being seen as the most important piece of marine legislation since UNCLOS came into effect in 1994.

## Two big challenges

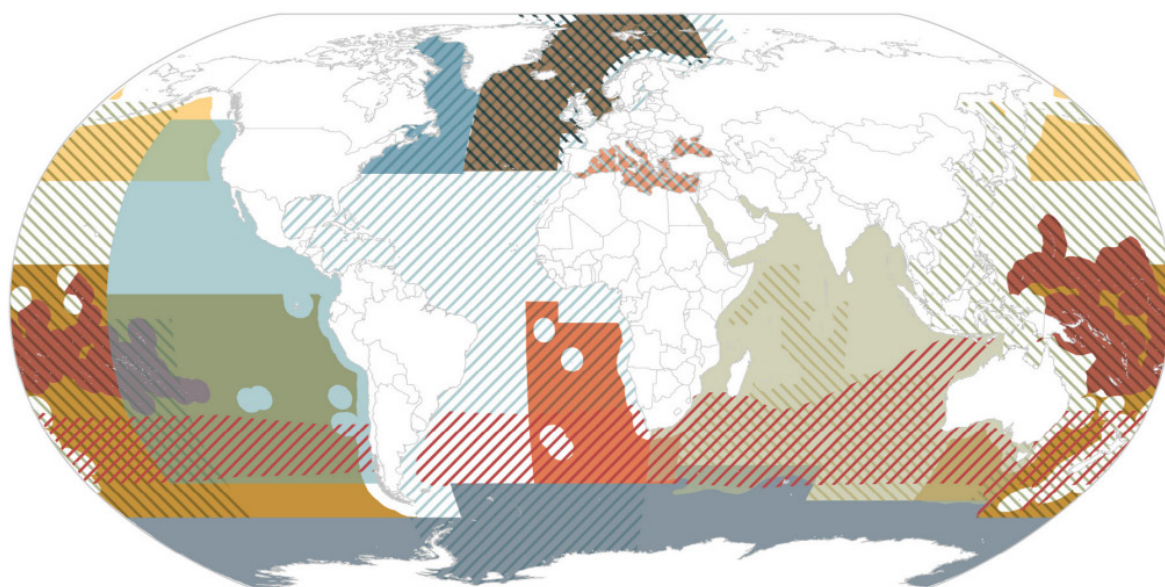
Xue Guifang, a polar and marine governance expert with Shanghai Jiao Tong University, sees two major problems facing the talks: they centre on concepts and interests.

“Senior academics in the field of international marine law commonly have very traditional ideas about the freedom of the seas, which will obstruct the talks,” says Xue, adding that some delegations do not recognise the concept of high seas biodiversity.

This is reflected in the sluggishness of the negotiation process. International recognition of marine biological diversity in areas beyond national jurisdiction (BBNJ) was reached in 2004 when the UN General Assembly set up a working group on the topic. However, it was only in 2015 that the working group proposed developing a treaty.

Even the preparation of a negotiating text for this meeting showed how old ideas continue to hamper progress. The earlier meetings were held on the principle that existing legal documents, frameworks and bodies would remain unaffected, but in all likelihood, the only way to achieve the aims of the talks is to restrict the freedoms enshrined in UNCLOS.

Hu Xuedong, deputy head of the office of the China Ocean Mineral Resources Research and Development Association, describes two opposing camps on high seas biodiversity: with the European Union on one side, and the United States, Russia and Japan on the other.



### Organizations included



*This map illustrates all international governance bodies with a high seas mandate, except those with global coverage — i.e., the International Whaling Commission (IWC), International Maritime Organization (IMO), and International Seabed Authority (ISA). These organizations collectively cover virtually all high seas areas and overlap in many places. Although there are many examples of multiple organizations managing the same region, few mechanisms exist to facilitate communication or coordinate activities among them.*

The EU wants to see rigorous third-party assessments of environmental impact assessments, and for mining to be permitted only when there is a full understanding of the risks. Such assessments would not only be expensive to produce, but perhaps impossible given current science and technology.

The US, Russia and Japan, on the other hand, want to see assessments based on “the most advanced science and technology” – that is, to understand the risks as far as capabilities allow. They refuse to consider third party assessments.

Similarly, creating a large network of marine reserves would restrict the current freedom to fish. In 2011 a marine reserve in the Antarctic’s Ross Sea was proposed but it was only in October 2016 that it was passed – and was a third smaller than originally planned.

“It’s clear that [a final treaty] will be put in place. But two years is optimistic, it could be three to five years, if not longer, because [discussion of] every topic is going to be slow,” says Xue Guifan.

### The nuances of China’s position


The BBNJ(Biodiversity beyond national jurisdiction) talks in New York will disrupt the existing marine governance system. Russia is strongly opposed to extending marine protection; Japan is also resistant. China, standing with other developing nations, has a more nuanced position.

Li Shuo, senior climate and oceans advisor at Greenpeace, thinks that China needs to promote “benefit sharing” (equal access to resources) with other developing nations. But China already benefits from significant advances it has made in marine science and technology, and is wary of surrendering too many of its own interests.

China’s distant water fishing fleet is the world’s largest; it has research teams working deep in Antarctic and Pacific waters; and prospecting teams working on the seabed. Backed by its economic strength, China has an increasing stake in global marine development and research.

“There aren’t many nations in the same awkward position as China,” says Li Shuo, referring to China’s conflicting interests of sharing access to natural resources with developing countries and protecting its own interests

The decision by five of the world’s largest krill fishing companies, including a Chinese firm, to halt fishing in ecologically vulnerable waters off Antarctica, along with a China-EU ocean partnership, are a positive sign that China is willing to compromise. China has long been opposed to protecting Antarctic reserves, but these subtle shifts have left people wondering if the country’s stance is changing.

Patrick Halpin, associate professor of Marine Geospatial Ecology at Duke University, hopes to see “China evaluate the role it plays in the migratory routes of marine species, and play a full role in their protection”. 

*Zhang Chun is a senior researcher at chinadialogue.*

# 远洋渔业监管：惩罚只是开端

专家指出，要在漂泊四海的中国远洋渔船上建立规范和秩序，  
需要更深层的体制改革。

□ 张 春



© 美国海岸警卫队

美国海岸警卫队和中国海警共同登临一艘在北太平洋涉嫌违法捕捞的中国渔船，发现被联合国海洋法公约禁止在公海使用的网眼极小的流网。这艘名为RunDa的渔船，在日本北海道东边的公海上被扣留

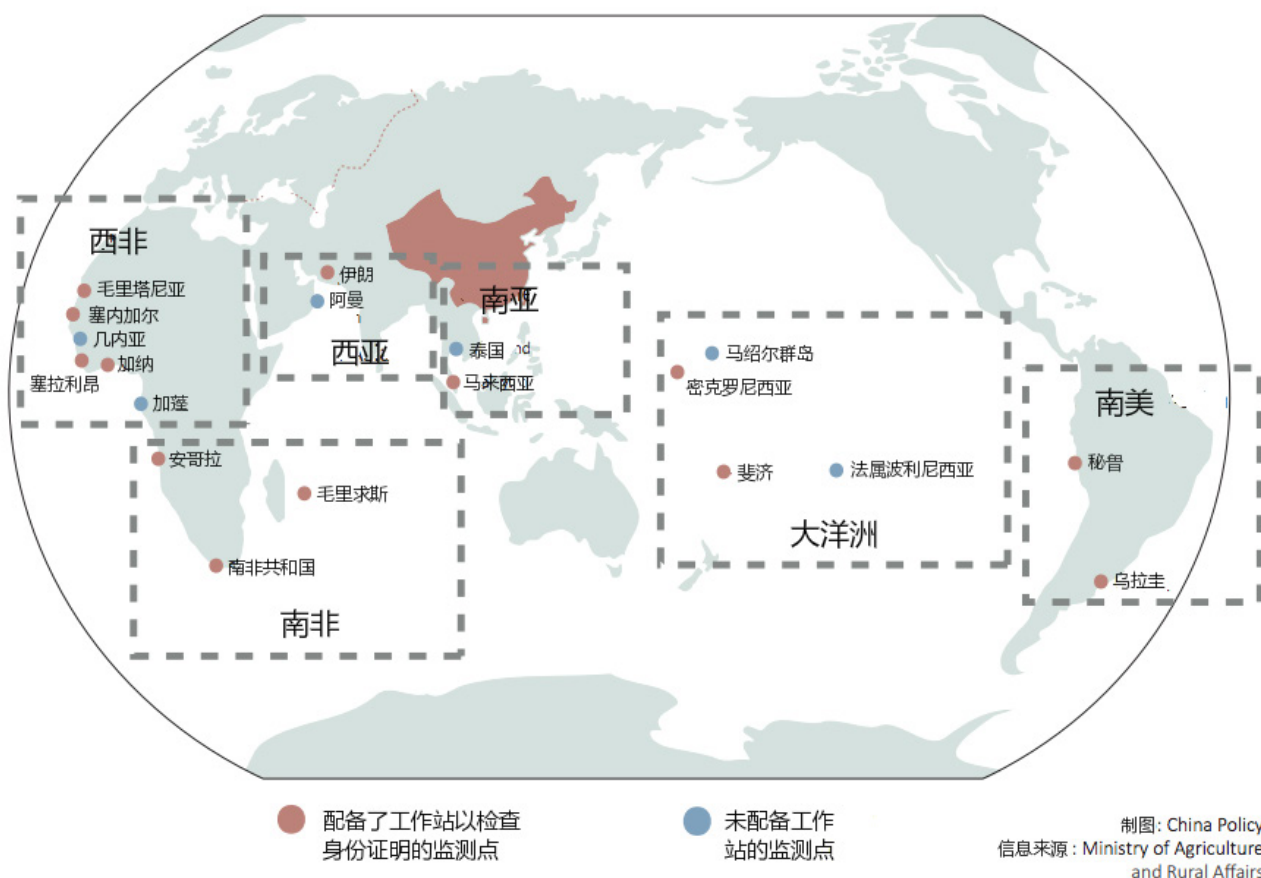
一艘装有濒危鲨鱼的违法中国远洋渔船在别国海洋保护区被抓，回国后会得到什么样的惩罚呢？中国进行远洋捕捞已有近30年，但直到今年2月之前，中国官方对此类事件的处置办法一直秘而不宣，“低调”处理。

2月底，中国农业部才第一次公开发布了对2017年违法远洋渔业企业和渔船的处罚通报。被通报的渔船和企业，普遍被取消全年油费补贴，停止运营，部分船员被列入黑名单，五年内不得从事渔业。这些受罚的船只中，就包括了文章开头提到

的那艘未经通报穿越厄瓜多尔加拉帕戈斯海洋保护区的福远渔冷999号船。

## 黑名单来了

对于远洋渔业船员和企业来说，



黑名单的迅速到来恐怕是他们始料未及的。

去年12月《十三五全国远洋渔业发展规划》(简称“远洋规划”)发布,要求控制行业规模并加强政府在海外渔业中的监管,紧接着12月底农业部宣布建立了远洋渔业黑名单制度。很快,今年2月名单正式公布,这意味着名单上的船长和企业老板像服用兴奋剂的运动员被禁赛一样,被强制“禁渔”。

为何“远洋渔业”监管突然祭出重典?时任农业部副部长于康震的说法是:“部分远洋渔业企业规模小、实力弱、管理不规范、安全发展意识不强,涉外违规事件时有发生。”

绿色和平海洋项目主任刘博雷也认为,近年频发的远洋渔业违法

违规事件确实给农业部造成了一定压力。他说,远洋规划的出台,已体现出中国远洋渔业发展思路由放到收的转变。

虽然早在2003年公布的《远洋渔业管理规定》中,就规定了严重违规者将取消从业资格,但是这些年处罚结果一直未有公开,外界不明确渔船违法是否会受到实质性处罚以及如何处罚。

除了上黑名单,违法后果较为恶劣的渔船将被取消全年油补。油补是远洋渔业重要的收入来源,一些企业甚至一半收入都来自油补,这对地方企业的威慑作用可见一斑。

对于在海上全权做主的船长们,上海海洋大学唐建业教授认为,这次的教训应该也很深刻:“(船长)失

去了证书以后,要想再进来担任船长职务,就必须5年后从基层开始一级一级地考试,实际上他们永远不可能再做到现在这个职位。”

## 远洋渔业的“病根”

不过仅仅处罚违规者并不足以解决远洋渔业问题。

与一些传统海洋强国不同,中国的远洋渔业仅30年便跃升世界规模第一,但如于康震所说,野蛮增长也带来了管理不规范、专业化标准化程度低等问题。

“在十二五(2010-2015)发展过程中,有一些小型的或者以前没有在这个行业从业的一些人进来。新的企业,规模又很小,之前还没有



从事过这方面的活动，这样导致增加了违规的概率。”唐建业说。

2017年9月，唐建业所在的上海洋大学联合中国远洋渔业协会，开始向企业管理人员提供履约培训，介绍区域渔业组织的规定和入渔国的规定。

“他们……（对相关法规）可能有一些概念，但是认识没有那么具体。”唐建业说。

## 监管洼地

当然，中国远洋渔船规则意识的淡漠，也与远洋渔业整个行业的监管现状有关。

例如，中国近2900条远洋渔船中，超过一半是在各国专属经济区付费捕捞。专属经济区指一国领海之外的部分海域，其中的自然资源归属该国，其他国家要进入捕鱼需缴费。

在他国“入渔”的正规程序，是在入渔前由中国和入渔国签订双边协定，入渔国提供资源调查情况，并协定可以捕捞的量，提供执法规定；中国提供入渔渔船的信息并缴纳入渔所需的费用。

但在现实中，一些国家没有能力做资源调查，没法制定最大捕捞额，所以交了钱就可以捕捞；还有一些国家没有执法能力，无法阻止违法捕捞。此外，鱼群洄游并不受海上人为国界线的限制，利用海域毗邻的国家法律规定的差异，寻找法制最薄弱海区进行捕捞，也是一种行业潜规则。

中国远洋渔船在超过40个国家的专属经济区中活动，这其中的监管洼地无疑助长了违法行为。

唐建业认为，欧盟2013年《共

同渔业政策》要求的“与第三方签订的入渔协定，必须基于最佳可获得科学证据，进行信息交换，确保入渔区域的渔业资源可持续开发，剩余可捕配额确定程序的透明化”以及“要求入渔协定包含对入渔国科学研究、MCS能力等方面的支持”，将是一个发展趋势。不过他也指出，资源调查、加强海上执法能力等内容，非中国单方可以改变。

## 补贴问题

不过，如何有效控制中国渔船自身的捕捞行为，仍然至关重要。

中国远洋渔业仍在增长。2016年远洋渔业捕捞量190万吨，比2010年增长78%；即便有3000艘渔船的控制目标，2020年捕捞量目标仍上涨到了230万吨。支撑这一增长的，则是国家巨额的财政补贴。

2006年，由于油价上涨，中国开始对渔业实施柴油补贴，以保证足够的渔获。从2006年到2014年，补贴额从2.81亿（约4100万美元）猛涨到了近42亿（约6亿美元）。

然而，享受了补贴的远洋渔业公司并未抓紧时间迅速提升捕捞效率，反而患上补贴依赖症，以至于很多渔船现在离开补贴就亏损。

尽管中国从2016年开始对渔业油补有所削弱，但2018年远洋渔业的补贴总额仍然达到36亿元（约5.2亿美元）。

“油补现在仍然是远洋渔业生产规范管理中最大的障碍。”咨询公司China Policy的渔业专家Ryan Penney说。他表示，中国希望将远洋渔业捕捞从低经济价值鱼类向高价值鱼类推进，补贴之类的国家支

持是必不可少的。但是，他也希望中国在油补这种恶性补贴讨论上能够“更开放一些”。

## 港口管理

另一条监管路径是加强对渔船进港的监管力度。

中国今年推出了十大渔港群建设的规划。更为先进的综合渔港建设好之后，将规范进港船只的渔获捕捞统计，更大程度减少非法渔获的流通从而阻止非法、不报告和不管制（IUU）的捕捞。

Penney认为，中国通过港口检查打击非法捕捞的工作严重不足，渔港建设可以帮助缓解这个问题。“中国还没有加入港口国措施协定，同时也没有能力进行他们承诺的港口渔获检查。我期待渔港建设可以促进这方面的进步。”他说。

港口国措施协定是专门针对非法、不报告和不管制（IUU）捕鱼的有约束力的国际协定，适用于寻求进入东道国港口的任何他国渔船。目前，包括美国、日本、韩国在内的55个国家签署了这一协定。

而中国想要在国际远洋捕捞行业中赢得更多的话语权，他认为，提升国内法律、践行并引导规范的国际渔业实践都是将来的重要工作。

张春，中外对话高级研究员

# China cracks down on illegal distant water fishing

The release of a list of blacklisted vessels points to the government's hardening line on DWF

□ Zhang Chun

China's fishery authorities have introduced hard-hitting punishments for overfishing and illegal fishing by the country's distant water fishing (DWF) vessels.

Chinese DWF vessels have been operating in the high seas or in other countries' exclusive economic zones for 30 years, but the authorities have taken a low-key approach to acts of wrongdoing. That changed in February this year when the Ministry of Agriculture published, for the first time, a list of DWF companies and vessels it had penalised in 2017.

Typical punishments included the loss of a year's fuel subsidies – vital for the profitability of many boats – cancellation of fishing licenses, and fishing bans of up to five years for named captains and crew members.

The list included the vessel *Fu Yuan Yu Leng 999*, which was caught in Ecuador's Galapagos Marine Reserve in August 2017. In its hull were almost 300 tonnes of fish on board, including more than 6,600 sharks and endangered species such as hammerheads. Twenty crew members received prison sentences of between one and four years.

## Surprise shake-up

Distant water fishing companies and crews were not expecting the changes.

In December 2017, the government published plans to control the size of the DWF sector and increase regulation over the 13th Five-Year Plan period (2016-2020). The Ministry of Agriculture then quickly followed up in the



*The Coast Guard uncovers an illegal 5.6-mile drift net onboard the fishing vessel the Run Da*

same month by announcing the creation of a blacklist system, publishing its first list two months later. Captains and company bosses on the list are banned from working in the fishing industry.

Why the sudden crackdown? At the time, Yu Kangzhen, deputy agriculture minister, said “some DWF companies are small and weak, with poor management, little safety awareness and continuing breaches of overseas regulations”.

Liu Bolei, oceans campaigner with Greenpeace East Asia, says repeated breaches by DWF vessels have put the ministry under pressure, which prompted a more hands-on approach.

Since 2003, regulations have included provisions for banning offenders from the industry, but bans have never been made public – before now. Nobody knew if breaches were punished, or how.

Removal of the year’s fuel subsidies is an effective punishment (providing half the revenue of some companies), but falls short of a ban.

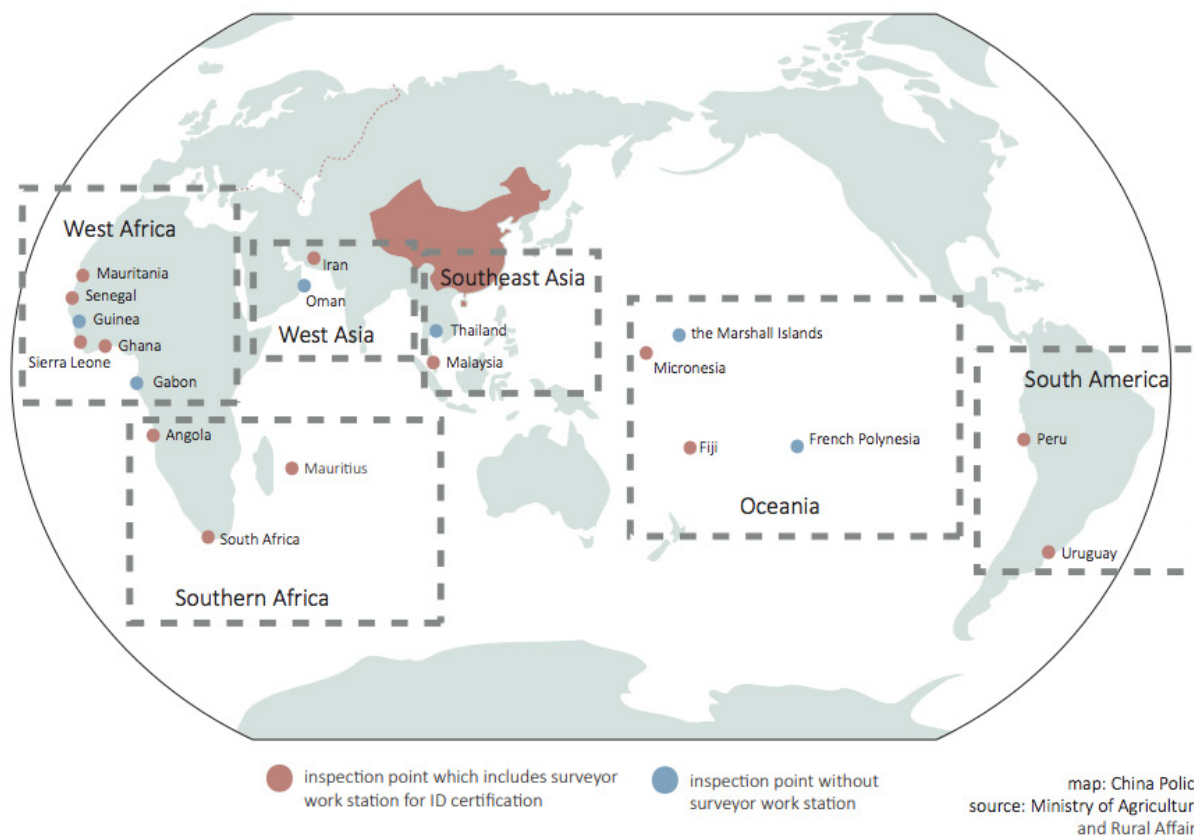
“A captain who loses his license will, if he wants to be a captain again, have to wait five years and then go through all the tests again, from the bottom. Realistically they’ll never get their old position back,” says Tang Jianye, professor of international fisheries law and policy at Shanghai Ocean University.

## Rapid growth, poor regulation

Punishing the culprits alone won’t solve China’s DWF industry’s problems. The sector has expanded over the past three decades to become the world’s largest. But regulation and professionalism have not kept pace with the sector’s explosive growth.

In particular, there were many new, small entrants to the DWF sector during the 12th Five-Year Plan period (2010-2015).

“As [the new entrants] hadn’t worked in the sector before, there was an increase in breaches of regulations,”



Layout of six regional overseas inspection points, as detailed by MARA. (Credit: China Policy report 'Distant water fishing: turning the tide')

says Tang Jianye. “They’ve learned idea [of the rules], but nothing concrete,” he adds.

To tackle this, Shanghai Ocean University and the China DWF Association provided compliance training to fishing company managers last September, explaining the rules of regional fishery bodies and national laws in other jurisdictions.

### Weak global enforcement

The problem is compounded by the limited enforcement capabilities of nations where China’s DWF vessels operate, which leads to complacency among fishermen.

For example, over half of China’s almost 2,900 DWF vessels pay fees to fish in exclusive economic zones (EEZs) – areas outside national waters but where a nation has exclusive resource rights.

The secure access to another country’s EEZ, typically China will enter into an agreement with the host nation, which itemises its fishery stocks, permissible catches and regulations. China then provides data on fishing vessels and pays a fee.

Some nations are unable to assess fishery stocks or set catch quotas, however, fishing still takes place as long as the fees are paid. Other countries lack the capacity to effectively enforce regulations.

Fish are not restricted by national boundaries so vessels commonly fish in the waters of countries that have the weakest regulation.

China’s DWF fleet is active in the EEZs of over 40 nations. Regulatory weak spots and poor enforcement encourage illegal behaviour.

Professor Tang says agreements are likely to become more robust as more countries adopt similar language to the EU’s 2013 Common Fisheries Policy. It emphasises “the best available scientific advice and relevant

information exchange, ensuring a sustainable exploitation of the marine biological resources”, and “transparency”, contributing to “the establishment of a high quality governance framework to ensure, in particular, efficient data collection, monitoring, control and surveillance measures”.

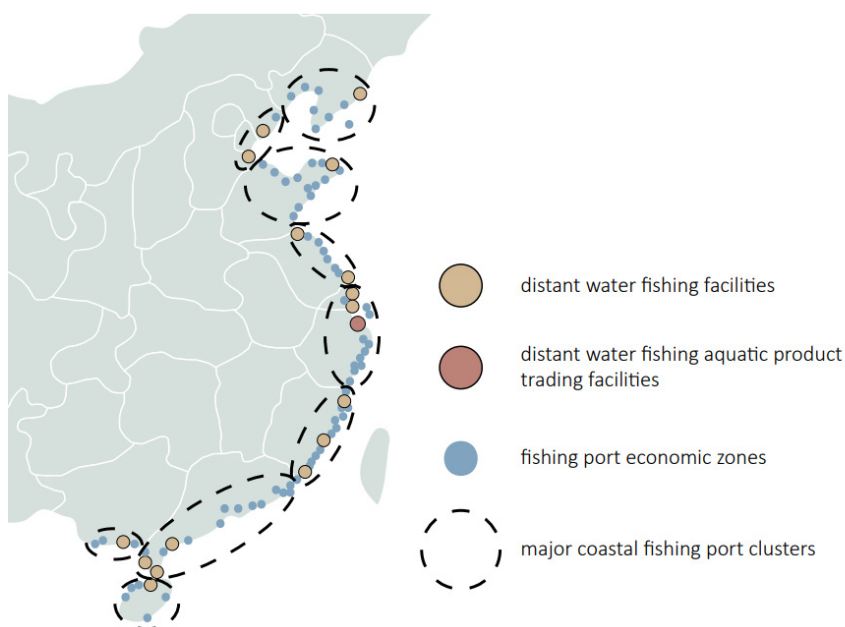
### Cutting fuel subsidies

Controlling the behaviour of Chinese vessels, and the fishing capacity of the fleet, is crucial to limiting illegal fishing globally.

China’s DWF sector is still growing: its 2016 catch of 1.9 million tonnes was up 78% on 2010.

The government intends to restrict the size of the DFW fleet to 3,000 boats by 2020, yet the catch is still set to rise to 2.3 million tonnes. Such growth in catch size is supported by generous state subsidies. These date back to 2006 when rising fuel prices prompted the government to subsidise fuel for fishing vessels, partly to ensure adequate catches.

Between 2006 and 2014, the cost of fuel subsidies rocketed from 281 million yuan (about US\$41 million) to 4.2 billion yuan (about US\$600 million). Without fuel subsidies many DWF companies would be loss-making.



map: China Policy  
source: 'National coastal fishing port construction plan (2018-25)' jointly released by MARA and NDRC

The ten fishing port clusters China is building (Image: China Policy)



China started to cut subsidy levels in 2016, but in 2018 they still stood at 3.6 billion yuan (about US\$520 million).

Ryan Michael Penney, a PhD candidate in anthropology at Stanford University and maritime policy analyst at ChinaPolicy who is researching China's maritime industry, predicts deeper cuts.

"I expect to see China continue to become more flexible in discussions on fishery fuel subsidies, which remains one of the biggest issues for regulating DWF industry production," he says.

## Better dockside checks

Another regulatory approach is to improve the management and tracking of vessels and their catches when they reach port.

China unveiled a plan this year to build 10 fishing port clusters with facilities to enable better data collection on catches.

The upgrades, which will take place between 2018 and 2025, will help prevent illegal catches reaching the market.

According to Penney, there is a severe lack of port checks so the new facilities should make a difference.

"China has not yet joined the key Port States Measures Agreement, and does not currently have the capacity to perform the inspections it calls for, but I expect to see them move toward joining as they develop the capacity," he says.

The Port States Measures Agreement is a binding international agreement targeting illegal, unreported and unregulated fishing, and applies to any vessel requesting access to host nation ports. There are currently 55 signatories to the agreement, including the United States, Japan and Korea.

Penney says that if China wants to have more of a say on DWF then it should look to strengthen domestic legislation and align itself with international industry practices. ☞

*With thanks to China Policy, authors of the report 'Distant water fishing: turning the tide'*

*Zhang Chun is a senior researcher at chinadialogue.*

# 跨境贸易威胁海龟生存

就在加州主办气候行动峰会之时，它却面临着大宗进口亚马逊石油的质疑。

□ 李依凡

**警**方强行进入越南海滨城市芽庄附近的一处隐蔽的仓库后，面对的是可怕的一幕：数千只经过化学处理的玳瑁海龟尸体标本堆积在他们面前。

越南警方对当地非法海龟交易网络展开的一系列突击搜查共查获约 7000 只玳瑁龟，总重 10 吨。这是有记录以来缉获非法海龟数量最多的一次，其中大部分海龟原计划将销往中国市场。

为满足中国客户对玳瑁等海龟产品的需求，非法贸易日益猖獗。中越边境和菲律宾每年都有类似的非法捕获、加工和偷运海龟进入中国的案件。

根据国际野生生物贸易研究组织 Traffic2012 年发布的一份关于海龟贸易的报告，2000 至 2008 年间中国占东亚海龟贸易申报总量的 98%，且目前没有出现放缓的迹象。

在中国文化中，海龟是财富和长寿的象征，玳瑁是民间传说中的四大神兽之一。讽刺的是，这种重要的象征意义和文化地位却推动了对海龟产品的需求。龟壳不仅是备受推崇的装饰品，也是一味中药。随着收入水平的提高，买得起这些产品的中国消费者越来越多。

## 全面濒危的海龟

海龟在维持海洋食物链平衡和生态健康方面发挥着重要作用，例如玳瑁海龟以海绵为食，有助于维持珊瑚礁系统的健康。海绵若不加控制，可能会威胁珊瑚的生存。

从东南亚到加勒比海，世界各地的热带海域都有海龟出没。目前，所有 7 种海龟都在世界自然保护联盟濒危物种红色名录上。

它们面临着来自人类活动的直

接和间接威胁。例如，沿海基础设施开发和珊瑚礁消失导致海龟筑巢海滩和觅食栖息地的数量大大减少。

海洋塑料垃圾的指数式增加也对它们构成了严重威胁。海龟经常把塑料当成水母误食，这会割伤它们或堵塞它们的肠道，并导致塑料垃圾吸附的毒素在它们体内积累。

此外，海龟尤其容易受到全球变暖的影响。海平面上升将进一步侵蚀海龟的筑巢海滩，气温升高会导致孵出的幼龟性别失衡，长远来看会威胁海龟的繁殖能力。

也有一些来自人类的直接威胁。海洋捕捞，尤其是海龟产卵的海滩附近捕捞活动的增加，导致越来越多的海龟意外被渔网捕获或缠住，从而受伤或溺亡。

包括海龟纪念品和工艺品、海龟肉和龟蛋等在内的全球海龟产品的消费和贸易则是一个更为紧迫的

“由于中国周边海域中已经几乎没有海龟，中国市场的原材料供应主要来自“珊瑚礁三角”区域，即菲律宾、婆罗洲附近生物多样性丰富的海域。”

威胁。这种贸易对玳瑁龟的威胁尤为突出，它们美丽的背甲一直备受收藏者推崇。

在中国，消费者购买美丽的玳瑁产品作为地位的象征，并相信这些东西可以驱邪。野生救援和英德知公司近期对北京、上海、广州、北海和三亚 1500 位居民进行的调查发现，17% 的受访者曾经购买过海龟产品，22% 考虑在未来购买。

## 非法海龟贸易

海龟产品的消费和贸易非常普遍，而且是全球性的。海龟的肉、蛋和龟壳在加勒比地区很受欢迎。在亚洲和东非沿海社区，人们也会捡

拾和买卖海龟蛋，因为它价格低廉，是当地人蛋白质和营养来源。

日本历来是亚洲海龟贸易的中心。日本的玳瑁手工艺品行业，即所谓的“别甲”（bekko）行业使用的是从东南亚和加勒比地区进口的玳瑁龟壳。1994 年日本禁止进口新的玳瑁龟壳之后，中国取而代之成为玳瑁需求大国。

海龟蛋、龟肉、龟壳工艺品消费在东亚和南亚地区很普遍

由于中国周边海域中已经几乎没有海龟，中国市场的原材料供应主要来自“珊瑚礁三角”区域，即菲律宾、婆罗洲附近生物多样性丰富的海域。在那里偷猎所得的海龟主要通过两条走私路线进入中国——

直接从南海销往海南岛，以及途经越南走私进入中国。

中国对海龟产品需求旺盛，而珊瑚礁三角区附近渔民的收入水平低，这让海龟走私成了一桩有利可图的生意。

在菲律宾和越南，一只玳瑁海龟的价格低至仅 70 美元，但制成标本后可以在中国卖到 1000 美元以上。

海龟在海南岛或者越南加工成标本、珠宝首饰以及其他工艺品。在越南加工的成品随后会跨过广西省的中越边境，走私进入中国。

菲律宾的巴拉巴克岛是活海龟和死海龟贸易网络上的主要中转站。海南和越南是加工中心，广西和海南两省则是中国境内的主要分销中心。



除了这些传统的走私渠道，近来还出现了个人从加勒比等地走私玳瑁龟壳的案例，说明非法贸易网络正日益扩大。

与此同时，中国的出境旅游，尤其是东南亚出境游的增长也让消费者更加接近海龟产品的供应方。

根据野生救援和英德知公司的调查，游客境外旅行时购买的海龟产品占海龟产品总销量的 21%。而在这些游客中，半数以上是听从旅行团导游的建议，才购买海龟产品作为纪念品的，还有 35% 的人则是在网上的旅游攻略中了解到这些产品的。

因此，中国海关当局近年来报告了多起在机场截获归国游客携带海龟产品的案例。

## 停止海龟贸易

非法贸易只是导致海龟面临困境的众多原因之一，但打击非法贸易对拯救海龟而言至关重要。

修复海龟的栖息地需要数十年的时间，栖息地保护也需要与经济发展之间做出重要的权衡。然而，遏制海龟产品贸易和减少偷猎可以从现在开始，如果能同时加强执法和提高公众意识，就会取得立竿见影的效果。

就像保护鲨鱼和大象那样，从长远来看，提高公众意识也有助于增强针对其他威胁海龟的人类活动

所需的政治势头。

几十年来，国际社会和各国政府已经认识到了保护海龟的迫切需要。全球范围内，所有 7 种海龟都被列入《濒危野生动植物种国际贸易公约》附录一及世界自然保护联盟濒危物种红色名录。

尽管《濒危野生动植物种国际贸易公约》的所有缔约方都有义务采取行动打击一切海龟产品贸易，但各国在这方面的决心和能力却相差甚远。例如，帕劳和格林纳达等国允许在规范合法的市场交易海龟产品，主要面向游客。

中国把附近海域发现的 5 种海龟都列为国家二级保护动物，并依法禁止杀害、运输和买卖海龟。

政府为了保护海龟的筑巢栖息地，还设立了广东惠东港口海龟国家级自然保护区。那里是中国大陆仅剩的海龟栖息地，但过去几十年间，来该保护区产卵的海龟数量急剧下降，从每年数百只减少至仅有 2 到 3 只。

尽管有这些保护措施，政府还需大力提高公众意识，让人们认识到海龟所受到的威胁。2017 年的调查显示，仅 57% 的受访者知道购买海龟产品在中国是违法的，其余则不确定或认为这些产品是合法的。

媒体和地方执法机关也普遍缺乏这种认识。四川的一位消费者甚至投诉快递延迟导致海龟肉变质，

而媒体和警方都只关注快递服务，丝毫不提进口海龟肉是违法的。

## 提高公众意识

一些人呼吁将海龟升为国家一级保护动物。2016 年，来自惠东国家保护区的黄细花为代表的 10 位人大代表在全国人大会议上提交了这一建议。

今年，政府将海龟、以及白海豚和斑海豹定为重点保护物种。

提高保护等级可能无法在短期内解决海龟栖息地面临的环境威胁，但提高惩罚力度有助于教育公众，让他们了解消费海龟产品是违法的，从而对从事非法海龟贸易的人起到震慑作用。

加强保护还可以让中国及其他国家的边境执法机构集中注意力打击海龟产品走私。

中国鱼翅需求的下降已经对全球鲨鱼种群产生了巨大的积极影响，象牙和非洲大象保护也在经历着类似的故事。通过减少中国的需求来打击非法海龟贸易可能会给物种保护带来另一个重大的突破。<sup>⑤</sup>

李依凡，野生救援组织海龟项目顾问，该组织报告《海龟：不确定的未来》作者



# Smugglers cashing in on sea turtles

Strong demand in China has extended the illegal trade as far as the Caribbean

□ Li Yifan



Sea turtles play an important role in maintaining a balanced food chain and healthy ecology in the ocean.

When police forced entry into a hidden warehouse near the Vietnamese beach town of Nha Trang they were met with a gruesome scene: thousands of dead and chemically taxidermied hawksbill sea turtles piled up in front of them.

Following a series of police raids on Vietnam's illegal turtle trade network, authorities seized 7,000 dead hawksbills weighing up to 10 tonnes. This was the single largest seizure of marine turtles ever recorded. Most of the sea turtles were bound north for the Chinese market.

The illegal trade that supplies China's demand for

hawksbills and other sea turtle products is thriving. Similar cases of illegal capture, processing, and smuggling into China are reported every year from the Sino-Vietnamese border and from the Philippines.

According to a 2012 report on the sea turtle trade by Traffic, an organisation that monitors the wildlife trade, China accounted for 98% of reported whole specimens traded in East Asia between 2000 and 2008. There is no sign of the trade slowing.

The sea turtle is a symbol of fortune and longevity in

“  
Sea turtles play an important role in maintaining a balanced food chain and healthy ecology in the ocean.  
”

Chinese culture. Folk legends refer to hawksbills as one of the four celestial guardian animals. Ironically, the symbolic importance and cultural respect for the animal has helped drive demand for sea turtle products, which are highly prized ornaments and ingredients in traditional medicine. As income levels in China have risen these products have become more affordable.

## All sea turtles are endangered

Sea turtles play an important role in maintaining a balanced food chain and healthy ecology in the ocean. Hawksbill turtles, for example, support coral reef systems by feeding on sponges. If these are left unchecked they can threaten the survival of corals.

Sea turtles are found in tropical waters around the world from Southeast Asia to the Caribbean. All seven species are now on the Red List of threatened species maintained by the International Union for Conservation of Nature.

They face several direct and indirect threats from human activities. For example, the development of coastal infrastructure and loss of coral reefs have significantly reduced the number of nesting beaches and feeding habitats for turtles.

The exponential increase of plastic waste in the ocean is also a critical threat. Sea turtles often mistake plastic for jellyfish and ingest it. This can cause injuries, block their intestines, and lead to the accumulation of toxins.

In addition, sea turtles are especially vulnerable to the impacts of global warming. Rising sea levels will further erode nesting beaches, and increased temperatures distort gender balance in hatched eggs, threatening the turtles reproductive capabilities in the long run.

In terms of direct threats from humans, increased fishing

activities in the ocean, especially near nesting beaches, has resulted in more turtles being injured or drowned following their accidental capture and entanglement in fishing nets.

A much more pressing threat is the global consumption and trade of sea turtle products, including souvenirs and crafts, turtle meat and eggs. This trade is a particular threat to hawksbill turtles, which are prized for their beautiful shells.

In China, consumers purchase hawksbill turtle products for their beauty, as a sign of prestige, and in the belief that they ward off evil spirits. A WildAid/Intage survey of 1,500 residents in Beijing, Shanghai, Guangzhou, Beihai, and Sanya revealed that 17% of respondents had purchased sea turtle products and 22% would consider making a purchase in the future.

## The illegal trade in sea turtles

The consumption and trade of sea turtle products is widespread and exists globally. In the Caribbean, sea turtles are exploited for their meat, eggs, and shells. In coastal communities in Asia and East Africa, sea turtle eggs are collected and traded as a cheap source of protein and nutrition.

Japan has been at the centre of the turtle trade in Asia historically. It imports hawksbill shells from Southeast Asia and the Caribbean to supply its hawksbill crafts industry, known as bekko. Japan banned the import of new hawksbill shells in 1994, after which demand from China took over.

China's coastal waters are heavily fished and there are few sea turtles left. The Chinese market now draws its supply of raw materials mostly from the Coral Triangle, an area of ocean rich in biodiversity near the Philippines and Borneo. From there the poached turtles are smuggled to China via two main trade routes – direct trade on the

South China Sea to Hainan Island and indirect smuggling to Vietnam and then to China.

The demand for sea turtle products in China combined with the low income levels of fishermen near the Coral Triangle makes sea turtle smuggling a lucrative business.

The price for one hawksbill turtle in the Philippines and Vietnam can be as low as US\$70, but a finished taxidermy product can sell for more than US\$1000 in China.

Processing turtles into taxidermies, jewellery, and other crafts takes place on Hainan Island in China, or Vietnam. In the latter case the finished products are then smuggled into China through border crossings in Guangxi province.

Along the trade network, the Filipino island of Balabac serves as the main transit point in both live and dead turtles. Hainan and Vietnam serve as the processing centres, and Guangxi province and Hainan as the main distribution centres within China.

In addition to these traditional channels of smuggling there are recent cases of individuals smuggling hawksbill turtle shells from places as far as the Caribbean, showing the growing reach of the illegal trade network.



*The Guangdong Huidong Harbour National Reserve to protect nesting habitats for sea turtles.*

Meanwhile, the growth in outbound tourism from China, especially to Southeast Asia, has also brought consumers closer to the supply of turtle products.

According to the WildAid/Intage survey, 21% of sea turtle consumers purchased products while travelling abroad. Within this group, more than half received recommendations from tour group guides to buy sea turtle products as souvenirs, and 35% said they learned about the products from online travel guides.

As a result, China's customs authority has reported many cases of intercepting sea turtle products from returning tourists at airports in recent years.

## Stopping the trade in sea turtles

The illegal trade in sea turtles is just one of many reasons for their decline, but combating the trade is crucial to saving the species.

It will take decades to restore sea turtle habitats, and reversing the trend in habitat degradation also create significant trade-offs with development opportunities. However, preventing trade of sea turtle products and reducing poaching can start now and will have an immediate impact if there is stricter law enforcement and greater public awareness.

Increasing public awareness can also help to build the political momentum needed to target other human threats to turtles in the longer term, as is happening in the case of sharks and elephants.

The international community and national governments have acknowledged the critical need to protect sea turtles for decades. Globally, all seven species of sea turtles are listed under Appendix I of CITES (The Convention on International Trade in Endangered Species) and on the IUCN Red List of threatened species.

Although all contracting parties to CITES are obligated to take measures against any trade in sea turtle products, determination and ability to combat the trade vary significantly across countries. For example, some member states, such as Palau and Grenada, allow regulated but legal markets for the products, mostly catering to tourists.

In China, the five species of sea turtle found in nearby waters are listed as national level II protected animals. This prohibits the killing, transporting, and trade of the animal by law.

The government has set up the Guangdong Huidong Harbour National Reserve to protect nesting habitats. It's the last remaining nesting place for sea turtles on mainland China. However, the reserve has experienced a sharp drop in the number of nesting turtles in the past few decades, from hundreds to just two to three turtles a year.

Despite these protections there is significant scope to improve public awareness in China of the threat to turtles. The 2017 survey showed that just 57% of correspondents knew that buying sea turtle products in China was illegal. The rest were unsure or believed that the products were legal.

This lack of awareness is also common among the media and local law enforcement. One consumer in Sichuan even complained about the delay and damage to a shipment of sea turtle meat. Both the media and police focused on the courier service, making no mention that importing the meat is illegal.

### Raising public awareness

Some are calling for protection of sea turtles to be elevated to level I. This was proposed at the National People's

Congress in 2016 by 10 delegates headed by Huang Xi Hua from the Huidong National Reserve.

This year, the government designated the sea turtle – along with the white dolphin and northern seal – as species worthy of protection.

Raising the level of protection may not solve the environmental threats to turtle habitats in the short-term. However, stronger punishments could help educate the public about illegal turtle consumption and deter those who engage in the trade.

Stronger protection would also focus the attention of law enforcement agencies within and beyond China's borders.

Reducing Chinese demand for shark fin is already making a huge difference in shark populations globally, with a similar story emerging with ivory and African elephants. Combating the illegal turtle trade by reducing demand in China could lead to the next big conservation breakthrough. ☞

*Li Yifan is advisor for Wildaid's sea turtle campaign, and author of the Wildaid report 'Sea turtles: an uncertain future'*



## 亚洲玳瑁海龟的主要贸易路线 Main trade routes of hawksbill turtles in Asia

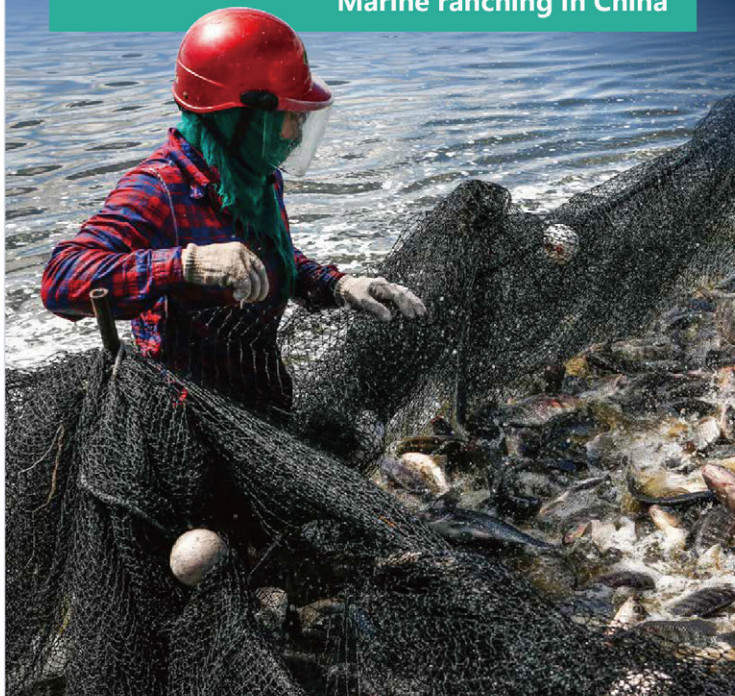


蓝色箭头显示了死海龟（其中大部分为未经处理或稍作处理的玳瑁龟）从珊瑚礁三角区的原产地走私进入南中国海，再通过非法贸易进入海南的路径。然后，这些海龟会在海南进行进一步处理和加工，制成成品。红色箭头表示，海龟从珊瑚礁三角区的原产地被运往越南进行处理和加工，然后再将成品或半成品经广西北海防城港的陆路边境走私进入中国的路线。虽然海南和北海是海龟产品重要的销售市场，但产品也销往中国其他城市。地图来源：野生救援

*The blue arrows denote the sourcing of sea turtles from the Coral Triangle and the smuggling of dead sea turtles, mostly untreated or lightly treated hawksbills, through illegal trade on the South China Sea to Hainan, where further treatment and processing into finished products occur. The red arrows denote the sourcing of sea turtles from the Coral Triangle, the treatment and processing in Vietnam, and the smuggling of finished or half-finished products from Vietnam to China via the land border at Fangchenggang to Beihai in Guangxi. Hainan and Beihai are themselves important markets for the sale of sea turtle products, but the products are also distributed to other cities in China. Source: WildAid*

# 中国海洋牧场

Marine ranching in China



全球海洋是地球的生命维持系统，但它维持生命的能力正走向危机的临界点。  
“中外对话海洋”致力于在一切尚可挽回之时，揭示、分析并帮助化解这场危机。

After years of experiments, China is planning to transform its fishing industry and restore fish stocks with an ambitious expansion of coastal aquaculture.

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