

Clean energy

清洁能源

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让阳光普照大地

The future is bright for solar power, even as subsidies are withdrawn

尽管补贴不再，太阳能的未来一片光明

FORTY-FIVE minutes west of Las Vegas, dejected sinners may encounter a sight to lift their sunken hearts: a sea of 347,000 mirrors, reflecting the rays of the desert sun on to boilers mounted on three 460-foot towers. The Ivanpah solar-thermal plant (pictured), which opened in mid-February, is the largest of its kind in the world. Fully ramped up, it will deliver around 377 megawatts (MW) of power to 140,000 homes in southern California. Its backers compare it to the nearby Hoover Dam; an astronaut claims to have spotted it from the international space station. It is a striking sight, even if the heat from its heliostats has roasted dozens of unfortunate birds alive. 距拉斯维加斯 45 分的地方，心情沮丧的罪人会看到一幅能照亮他们沉没的心的奇观——34.7 万面镜子组成的海洋反射着沙漠太阳的光至三个高达 460 英尺的塔上的热水器。于二月中旬开始运行的伊凡帕太阳能热电厂（如图所示）是目前世界上最大的太阳能热电厂。开足马力，该电厂能为加利福尼亚南部 14 万居民提供 377 兆瓦的电力。其支持者将它比作附近美国最高的水坝胡佛水坝。甚至有宇航员说他能在国际空间站找到这个太阳能热电站。尽管电站的定日镜反射的热量硬是 将数十只活生生的飞鸟烤熟了，这依然是一道令人叹为观止的风景。

Solar power in America is growing rapidly, albeit from a small base (see chart). Last year it represented 29% of new electricity capacity, behind only natural gas at 46%. Solar output has more than doubled during Barack Obama's time in office; GTM, a research firm, reckons it will grow another 26% in 2014. The Department of Energy wants solar to provide 27% of America's electricity by 2050, up from less than 1% today.

虽然太阳能在美国起点低（见下面图表），但发展迅捷。去年太阳能发电占新增电力的 29%，仅落后于占 46% 的天然气发电量。既奥巴马上任以来，太阳能的产出翻了不止一番。全球决策大本营这个调查机构称太阳能发电在 2014 年将新增 26%。美国能源署希望太阳能发电能够由目前提供的不足 1% 的电力发展到能够在 2050 年前提供美国 27% 的电力。

Though dazzling, Ivanpah and large plants like it will not generate much of this growth. The federal loan guarantees that allowed their creation have expired. More important are photovoltaic solar cells, a rival technology that converts sunlight directly to electricity. Their cost has fallen so quickly that in many places retail electricity customers are saving money by placing panels on top of their houses or businesses; 200,000 have done so in the past two years. And there is a lot of room to grow. "There's no market saturation in any state; not even close," says Lyndon Rive of SolarCity, a solar-installation firm. Even David Crane, the boss of NRG, co-owner of Ivanpah, says that photovoltaic installations are the future.

尽管目前风头正盛，伊凡帕以及像它一样的大公司却不能从这样的增长中获益太多。因为作为用于保障他们创造的联邦贷款到期了。更重要的是光电太阳能电池，它是一种关键的技术能直接将太阳光转化成电力。由于该产品的价格急速下跌，许多地方的零售电力的客户将太阳能板安装在他们的屋顶或厂房房顶来发电来节省开支。过去的两年已经有 20 万人这么做了，并且其增长的空间很大。来自太阳城一家太阳能设备安装公司的 Lyndon Rive 称“目前不管在哪个州，都没有市场达到饱和，甚至是接近饱和。”甚至作为伊凡帕共有者的 NRG 能源电力的 David Crane 也声称未来是光伏发电装置的天下。

Last year sun-soaked California accounted for over half of America's new photovoltaic installations. That, say solar fans, shows that the sector can thrive even after it loses its subsidies. (The \$2.2 billion California Solar Initiative, which gave cash to homes or firms that went solar, has largely expired.) Solar is also blossoming in unexpected places like Massachusetts and North Carolina.

去年，饱受太阳炙烤的加州，其新增的光伏发电装置安装的数量超过整个国家数量的一半。太阳能的支持者称这表明即便没有补贴，太阳能发电也会前途无量。（加州太阳能计划得到 22 亿美元的补助，用于补贴那些使用太阳能的家庭和公司，如今这一补助绝大部分已到期。）此外，在人们想不到的像马赛诸塞州和北卡罗来纳州这样的地方太阳能发电也如花般绽放。A bigger test will come in 2017, when the federal government's solar-investment tax credit drops from 30% to 10% (unless Mr Obama can convince Congress otherwise). Still, says Shayle Kann at GTM, this will be no “death knell”; it will simply eliminate some marginal projects. And by then there may be a revival of Ivanpah-style solar-thermal plants, as energy-storage technologies improve and utility firms look to them to provide steady power throughout the day.

更为严峻的挑战将在 2017 年拉开序幕。那时，联邦政府的太阳能投资税收抵免将由现在的 30%骤降至 10%，除非奥巴马总统能够说服国会不这么做。即便如此，GTM 调查机构的 Shayle Kann 声称，这也不是太阳能发电的“死亡钟声”，而仅仅是终止一些边际项目。随后，随着储能技术的发展以及公共事业公司采用这一技术为全天提供稳定的电力，像伊凡帕这样的太阳能热电站还会再次兴盛起来。

Yet even if solar power is a boon to consumers, it threatens some utilities. Energy has traditionally been generated centrally, distributed over power lines and sold to consumers. Distributed solar power—generated from rooftop panels—undermines that model (see article). The Edison Electric Institute (EEI), a trade group, warns that distributed generation could do to energy companies what the internet did to newspapers.

但是，尽管太阳能电力对消费者有利，它却威胁到其他的公共事业。传统的能源供应是集中式的，通过电线输送到用户家中。分散的太阳能电力是通过人们屋顶的太阳能板发电的，将会颠覆这一传统模式（见文章）。贸易集团爱迪生电力协会警告称，分散发电对能源公司的冲击就如同互联网对新闻报纸产业的冲击一样。

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Regulations are adapting to this shift: all but seven states have adopted net-metering policies, which credit solar-enabled homes and businesses for the excess energy they feed back into the grid. At least 22 states allow consumers to buy the electricity produced by solar panels that a third party installs on their homes. This lets people take advantage of solar's savings without having to pay the hefty up-front installation costs. In 2013, third-party-owned systems accounted for most solar installations in California, Arizona, Colorado and Massachusetts.

立法正在适应这一转向：除了 7 个州以外其他各州都颁布了电价扣减政策，允许安装了太阳能的家庭和企业太阳能自足之后将多余的电并入电网。至少 22 个州允许消费者购买第三方安装在他们屋顶的太阳能电池板产生的电。这使得人们不用支付高额的前期安装费用就能享受到太阳能带来的实惠。2013 年，第三方太阳能系统覆盖了加州、亚利桑那州、科罗拉多州及马萨诸塞州太阳能安装业务的几乎全部的份额。

Some utilities grumble that customers who benefit from net metering escape the costs of maintaining the grid they depend on. Last year Arizona Public Service, the state's biggest electric firm, urged regulators to slash the savings that new solar customers would derive from net

metering. After a fierce campaign their call was rejected, though the regulator approved a small solar surcharge. Georgia Power also proposed a fat tariff; it too was defeated.

某些公共事业单位抱怨从电价扣减政策中获益的消费者逃避用于维护他们赖以继的电网的费用。去年，亚利桑那公共服务公司，盖州最大的电力公司敦促监管者严厉批评新增的太阳能电力消费者通过电价扣减政策而得到的储蓄。经过激烈的争夺，尽管监管者批准了小额的太阳能额外费，他们的呼声最终被驳回。佐治亚电力公司也建议要加重赋税，但也被驳回。

Julia Hamm of the Solar Electric Power Association identifies three ways regulators could help utilities cope with these changes. First, they could demand monthly infrastructure fees from solar users. Second, they could list every component of value separately rather than wrapping the cost of infrastructure maintenance, for instance, into usage charges. Third, they could split energy used and consumed into separate transactions, meaning that a solar customer sells all his energy to a utility before buying what he needs.

美国太阳能电力协会的 Julia Hamm 提出三种解决方案帮助公共事业公司面对当前的变化。第一，公共事业公司每月向太阳能使用者收取基础设施使用费。第二，单独列出每个组件的价值而不是将基础设施维护费均摊到电价中。第三，他们可以将使用的能源和消耗的能源分开处理，即太阳能消费者将其生产的电卖给公共电力公司然后再向他们购买他们需要的电。

Yet those last two proposals leave unanswered the question of what rate utilities should pay customers for their power—or more broadly, what the price of solar, with all externalities factored in, ought to be. And more battles loom; California's regulator must make an important decision on net metering this month. Further ahead the growth of distributed solar will pose other threats to the utilities' traditional business model. “Net metering is just the pointy edge of the wedge,” says Adam Browning of Vote Solar, an advocacy group.

然而后面的两个提议依然没有解决公共电力公司应该按照什么样的比例购买消费者家多余的电的问题，或者更明确的说，考虑到所有的外部因素，太阳能电的价格应该怎样确定。这一问题似乎一直都若隐若现。这个月，加州的监管者必须就电价扣减这一问题作出重要的决定。分散的太阳能发电的进一步发展将会对公共电力公司传统的商业模式构成其他威胁。“电价扣减仅仅只是楔子最尖锐的部分（电价扣减只是利用太阳能问题中最尖锐的问题，还有其他的问题）”拥护太阳能的 Adam Browning 如是说。

Still, while user-generated solar power makes utilities skittish, many have rushed to embrace it on the supply side. In 2013 they installed roughly 4,100MW of solar capacity, up from 2,390MW in 2012. Renewable portfolio standards, which in 30 states force utilities to generate a certain share of their electricity from clean sources, are part of the reason. But so is hard economics: low installation and labour costs, clean power delivery at peak midday hours and a hedge against fuel-price volatility.

尽管用户产生的太阳能电力让公共电力公司愤怒，许多人依然会挤着去供应自家发的电。2013 年人们安装的太阳能发电板所发的电量由 2012 年的 2390 兆瓦上升到 4100 兆瓦。可再生能源发电配额制，30 个州要求公共电力公司生产一定份额的清洁能源电力是人们蜂拥安装太阳能电池板的原因之一。对于理性的经济而言也是如此：安装费用低，人力资源消耗低，在中午用电高峰期输送清洁能源以及可以抵御波动的石油价格。

Many of these gains have already been banked. Photovoltaic modules have become slightly dearer lately; costs will rise further if the Commerce Department heeds protectionist calls by some domestic manufacturers and expands tariffs on imports from China and Taiwan. Yet solar firms are

not short of ideas to cut costs elsewhere: third-party financing, for example, or securitising pools of solar leases to reduce financing costs. For makers and users of solar power, the future looks bright.

这些收益都已经存入银行。近来光伏模块价格稍有上涨。如果商务部注意到国内生产商的贸易保护电话并且加重从中国和台湾进口光伏模块的关税，安装太阳能板的成本将进一步上涨。然而太阳能公司有的是办法从其他方面削减成本：第三方融资，比如说对太阳能租赁的抵押来降低融资的成本。对制造商和用户而言，太阳能的未来前途璀璨，一片光明。