



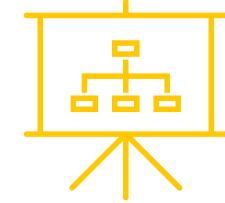
# 欧洲碳市场推动电力行业绿色转型 EU ETS and power sector transformation

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ECECP Workshop, 19 August 2021

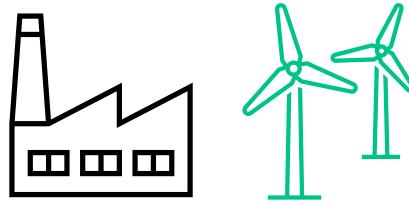
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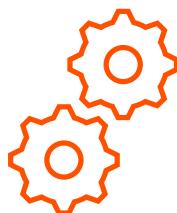
## 欧盟碳市场介绍以及最新发展动向

EU Emissions Trading System and latest trends



## 碳市场推动电力行业转型的机理

The role of carbon market in power sector transformation

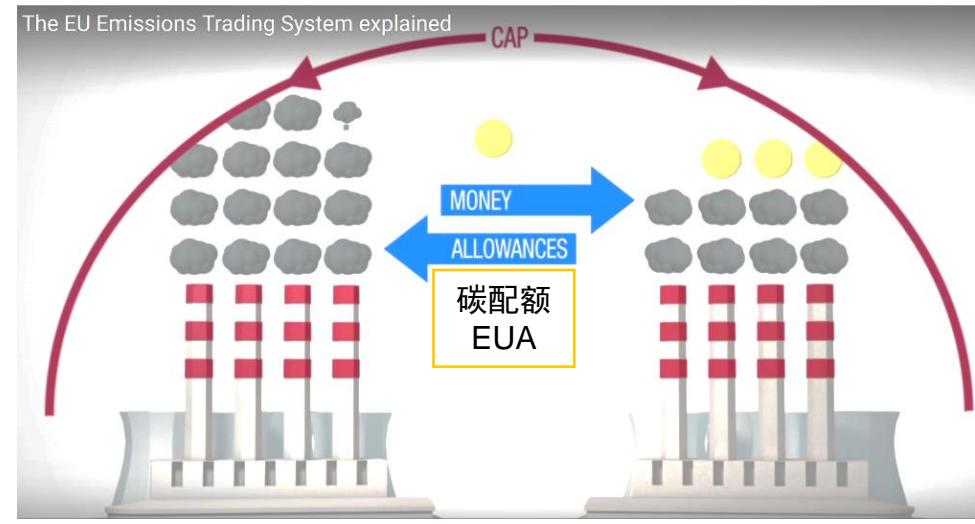


## 欧盟绿色新政和Fit for 55提案将进一步改革碳市场

Green Deal and Fit for 55 proposals will strengthen ETS and support carbon price

# 欧盟碳排放交易体系 EU Emissions Trading System (EU ETS)

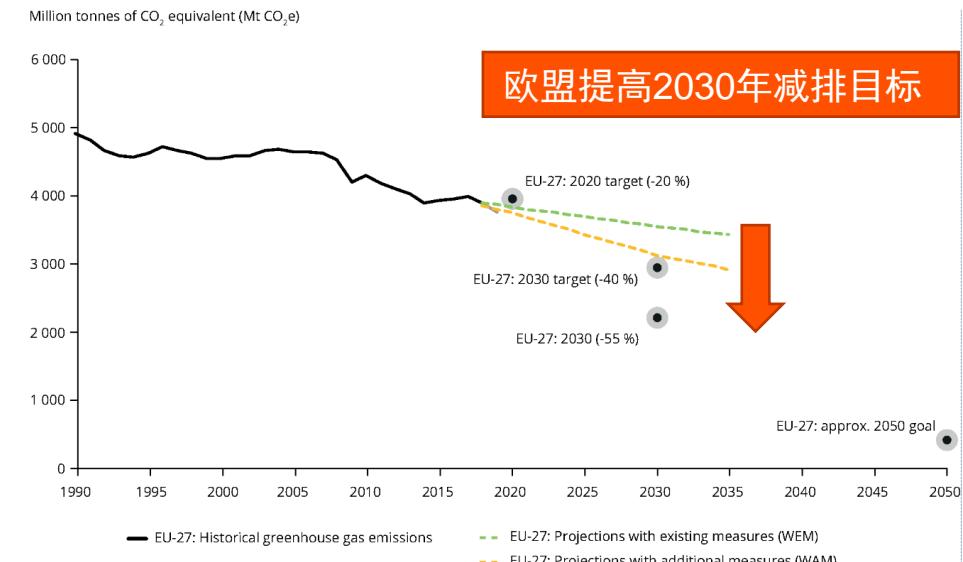
- 2005年启动，覆盖欧盟27国\*以及挪威冰岛和列支敦士登，并和瑞士碳市场链接
- ~12000个排放设施
- 是欧盟气候变化政策的基石
- 覆盖欧盟约40%的温室气体排放量
- 总量限额和交易 Cap and Trade



- Since 2005, cover EU27\*, Norway, Iceland, Lichtenstein, and linked to Swiss ETS\*
- ~12000 installations
- Cornerstone of EU climate policy
- ~40% of EU GHG emissions
- Cap and Trade

欧盟的气候目标分解到  
碳市场和非碳市场行业  
各自承担的减排义务

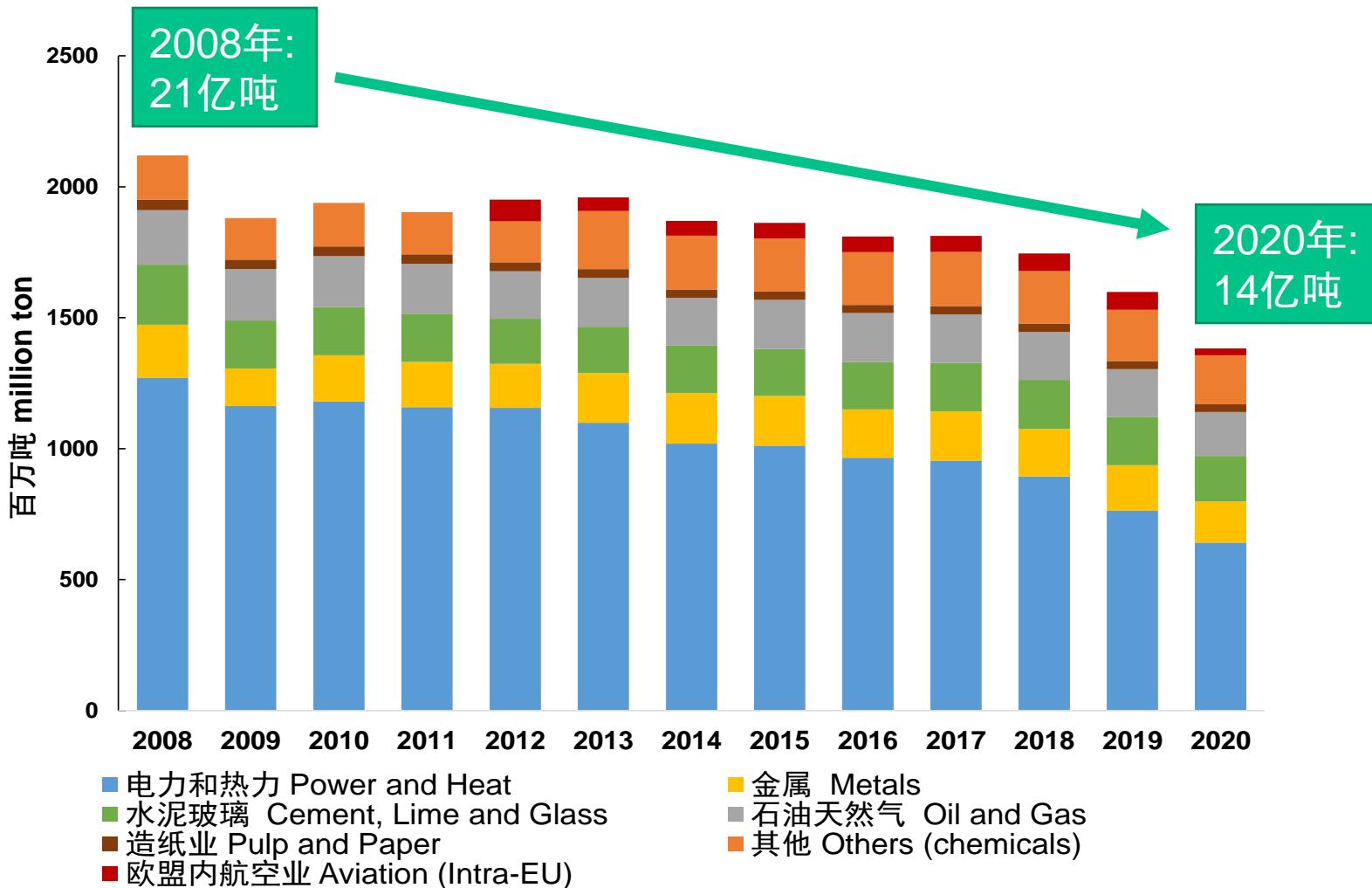
EU climate target then  
shared between the  
burden of ETS and  
non-ETS sectors



\*英国2021年正式脱欧以后，成立单独的碳排放交易体系  
UK established its own ETS after formally leaving the EU in 2021

# 欧盟碳市场行业排放量逐年下降，电力行业减幅更大

EU ETS sectors' emissions on declining path since 2008, especially in power sector



# 欧盟碳市场注册登记系统 (EUTL – European Union Transaction Log)



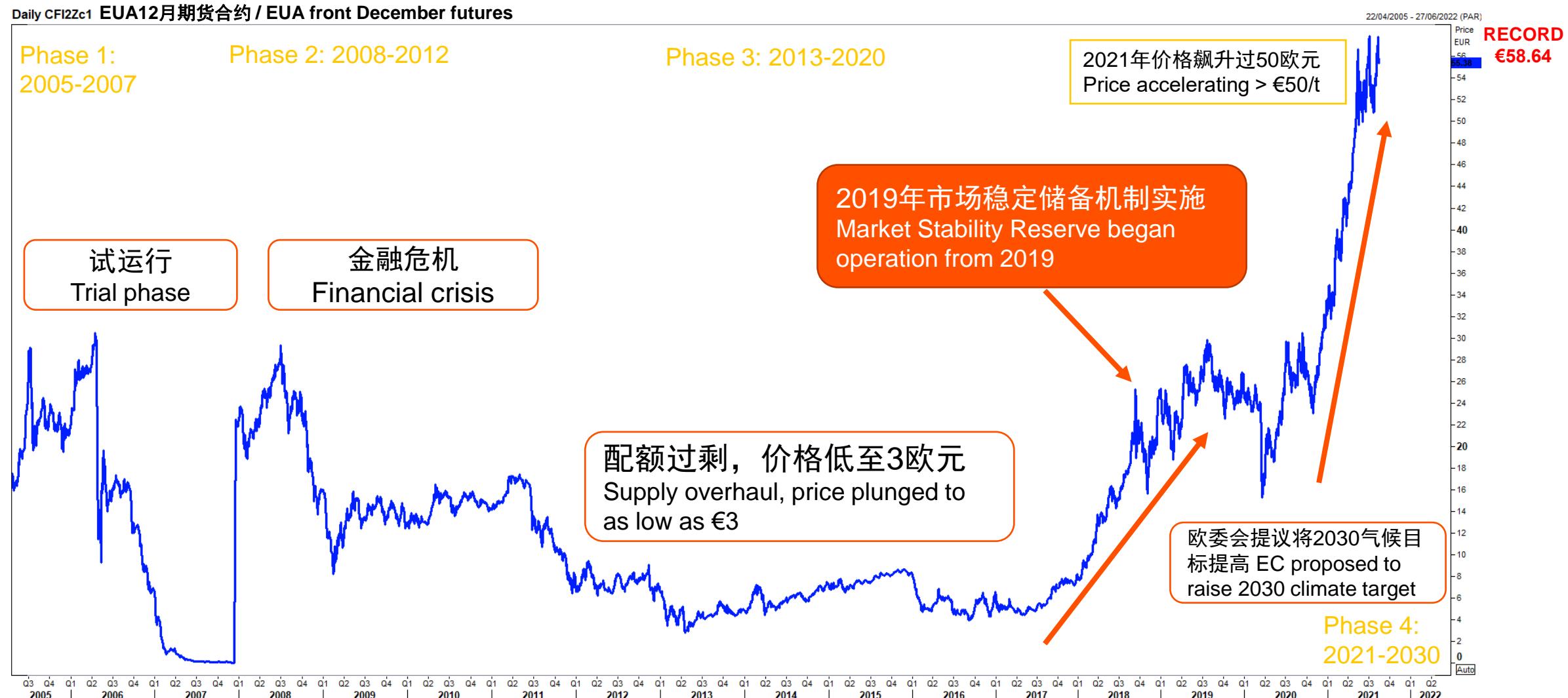
European Union Transaction Log

EUROPA > European Commission > Environment > Climate Change > European Union Transaction Log

Operator Holding Account Information											
Installation Information											
National Administrator	Germany	Account Type	100-Holding Account	Account Holder Name	RWE Power Aktiengesellschaft	Installation ID	1606	Company Registration No	HRB 17420 Amtsgericht Essen	Account Status	open
Type	Name	Legal Entity Identifier	Main Address Line	Secondary Address Line	Postal Code	City	Country	Telephone 1	Telephone 2	E-Mail Address	
Account holder	RWE Power Aktiengesellschaft		RWE Platz 2	--	45141	Essen	Germany				
阶段 年度 免费配额 实际排放量 缴纳配额 履约状态											
EU Compliance Information											
EU ETS Phase	Year	Allowances in Allocation	Verified Emissions	Units Surrendered	Cumulative Surrendered Units**	Cumulative Verified Emissions***	Compliance Code	Options			
2005-2007	2005	16903648	17980947	17980947	17980947	17980947	A*	<a href="#">History</a>			
2005-2007	2006	16903648	17917668	17917668	35898615	35898615	A*	<a href="#">History</a>			
2005-2007	2007	16903648	16795941	17032935	52931550	52694556	A*	<a href="#">History</a>			
2008-2012	2008	8379517	17950607	17950484	17950484	17950484	A*	<a href="#">History</a>			
2008-2012	2009	8379517	17870203	17870203	35820687	35820356	A*	<a href="#">History</a>			
2008-2012	2010	8379517	16939457	16939457	52760144	52759282	A*	<a href="#">History</a>			
2008-2012	2011	8462697	19563072	19563072	72323216	72321785	A*	<a href="#">History</a>			
2008-2012	2012	19157544	31227456	31227579	103550795	103550795	A	<a href="#">History</a>			
		2777	.....	34859000	34859000	33254389	A*	<a href="#">History</a>			
		7761	.....	32441213	32441213	67300213	A*	<a href="#">History</a>			
		2416	.....	30465006	30465006	97765219	A	<a href="#">History</a>			
		6946	.....	31321639	31321639	129086858	A	<a href="#">History</a>			
		2080	.....	29900372	29900372	158987230	A	<a href="#">History</a>			
		6154	.....	32156657	32156657	191143887	A*	<a href="#">History</a>			
		1766	.....	22596980	22596634	213740521	A	<a href="#">History</a>			
		5386	.....	18671292	18671292	232411813	A	<a href="#">History</a>			
		1491	.....					<a href="#">History</a>			
		4643	.....					<a href="#">History</a>			
		1260	.....					<a href="#">History</a>			
		3924	.....					<a href="#">History</a>			
		1037	.....					<a href="#">History</a>			
		3227	.....					<a href="#">History</a>			
		822	.....					<a href="#">History</a>			
		2557	.....					<a href="#">History</a>			
		3346	.....					<a href="#">History</a>			
		3260	.....					<a href="#">History</a>			
		3173	.....					<a href="#">History</a>			
		3087	.....					<a href="#">History</a>			
		3001	.....					<a href="#">History</a>			

# 欧盟碳配额价格由于供给过剩长期处于低位，在碳市场改革方案出台后近年大幅回升，过50欧

EU ETS allowance price stayed at low levels for years, then rebound strongly on market reform policy, >€50



# 碳交易参与者类型: 控排企业为主, 同时金融机构的参与程度逐渐提高

EU Carbon trading participants: mainly compliance entities, increasing share of financial institutions



## 控排企业: 通过交易优化履约成本

**Compliance entities:** emitters optimize costs through trading (Power hedging, Industry procurement)



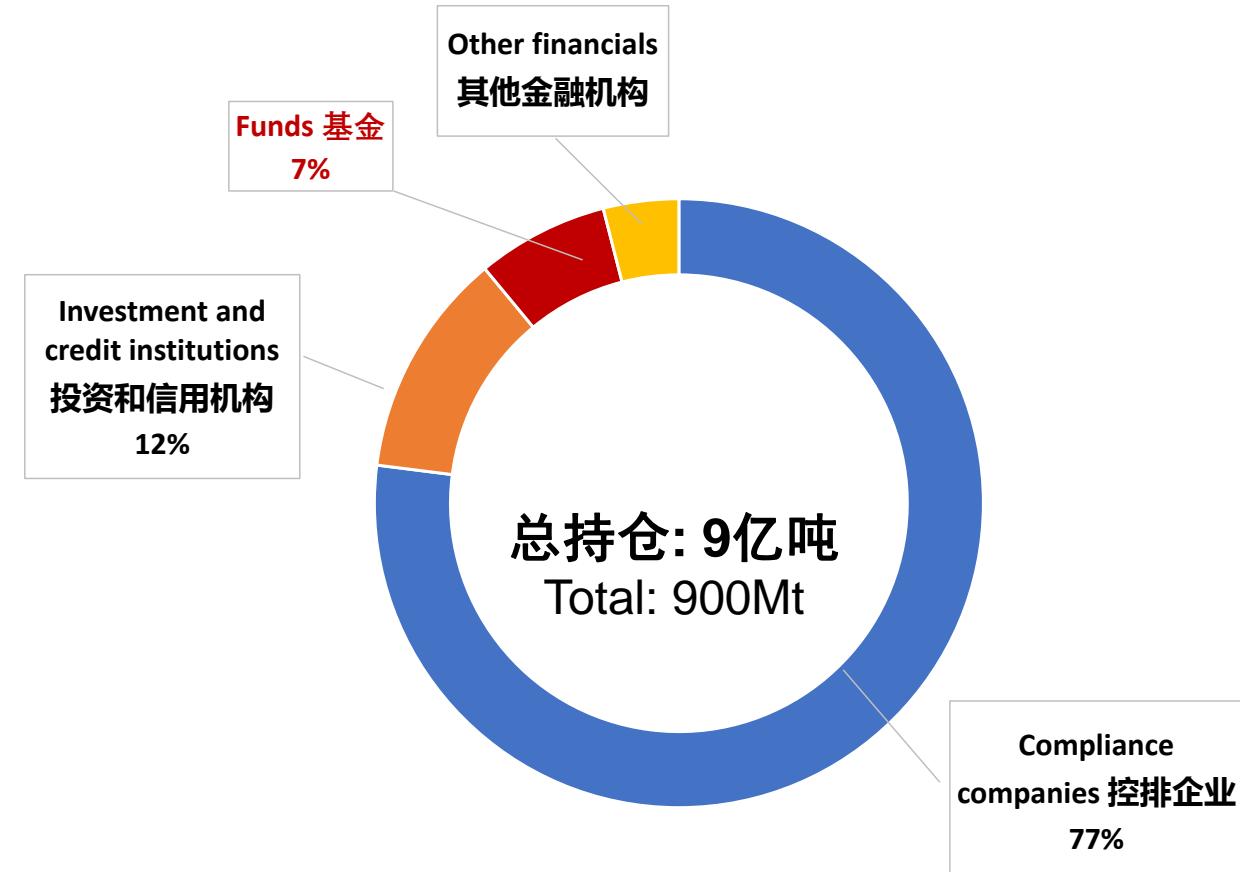
## 金融机构: 提供中介的职能, 增加市场流动性

**Financial institutions:** intermediaries or brokers to improve liquidity

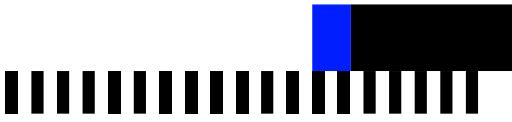
基金所占的份额也略有上升, 主要目的为了利用碳配额对冲资产的气候风险

*Increasingly share of Funds' position, mainly for hedging climate risks of assets*

2021年8月6日各类型机构期货多头持仓份额(ICE交易所)



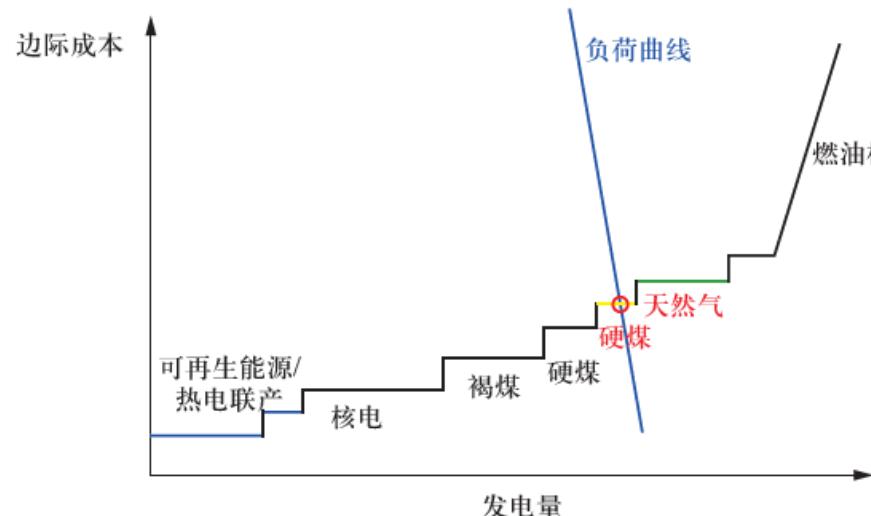
碳金融产品多种多样, 包括拍卖, 现货, 期货, 期权和远期等, 其中12月期货为标杆合约, 日均交易量3000万吨  
Carbon products, including auction, spot, futures, options and forwards etc. December-futures are benchmark contract with daily trading volumes ~30Mt



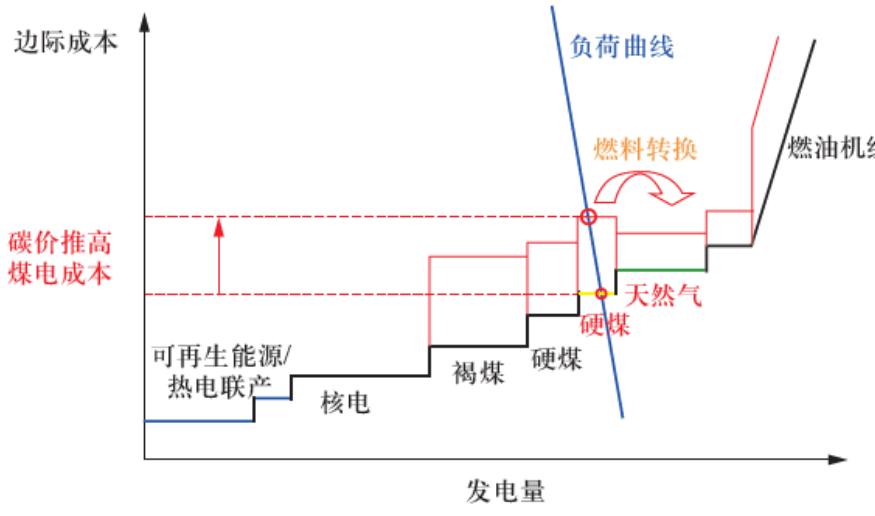
## 碳市场推动电力行业转型的机理 The role of carbon market in power sector transformation

- 短期内推动气电替代煤电
  - 长期内提高可再生能源和低碳技术的优势，激励投资
- 
- Short term: coal to gas switching
  - Long term: promote investments in renewables and low carbon technology

# 碳价推动电力市场中燃料转换: 气电替代煤电 Carbon price drives coal to gas fuel switching

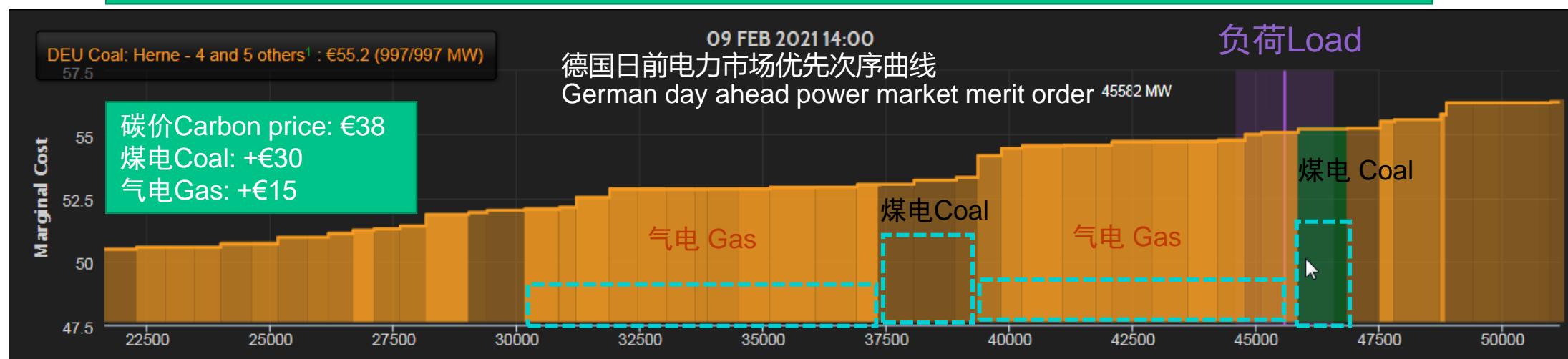


(a) 引入碳价前的优先次序曲线和出清机组



(b) 引入碳价后优先次序曲线和出清机组

因为度电的碳排放，煤电是气电的两倍(0.8 t/MWh vs 0.4)，所以煤电的碳价成本就高，碳价使得气电更有优势



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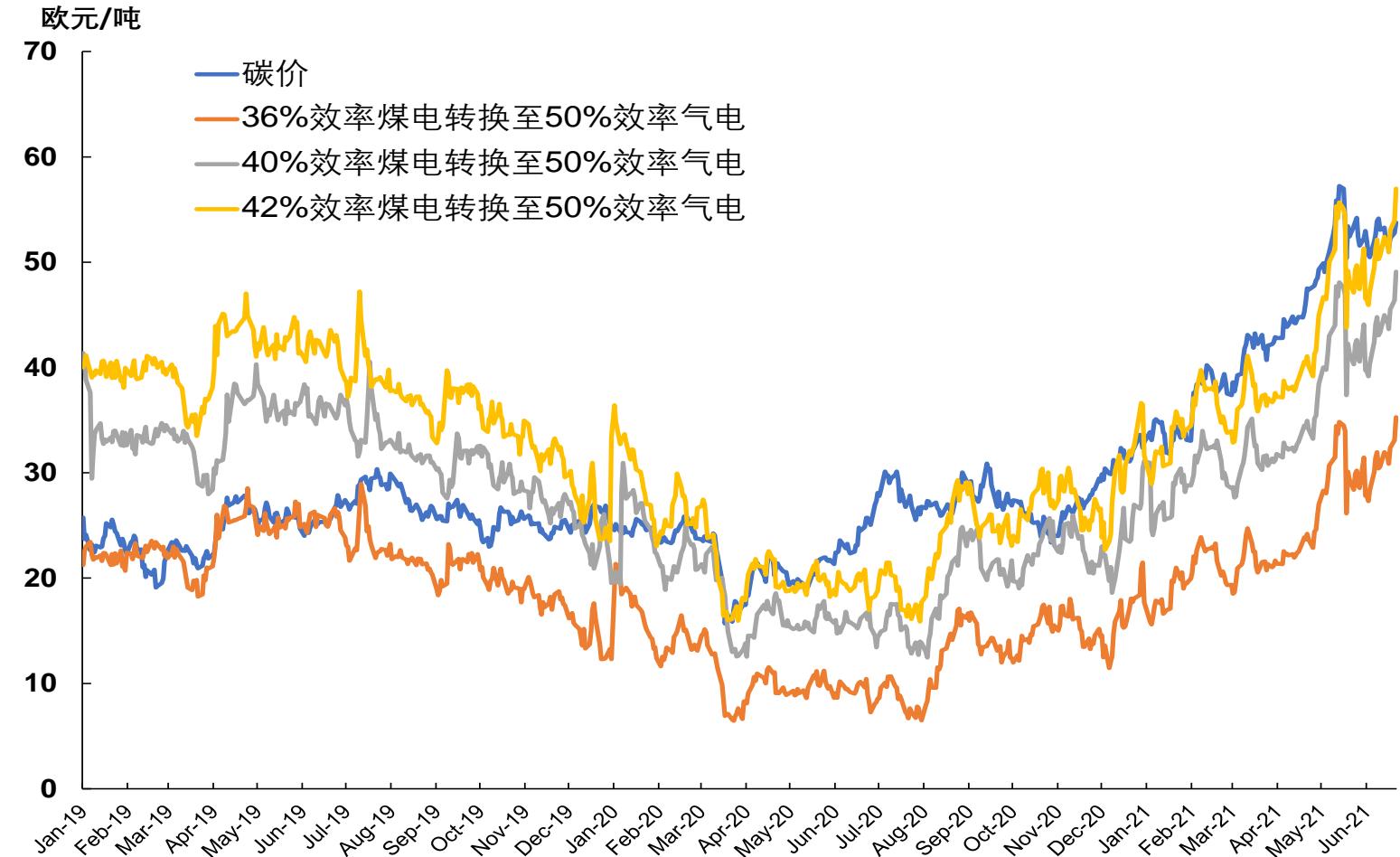


# 燃料转换价格，也即使得气电和煤电短期边际成本相等的理论碳价

Fuel switching price is the theoretical carbon price that makes the short run marginal cost of coal and gas power equal

碳价反映减排成本，而燃料转换就是电力行业短期内实现减排的措施

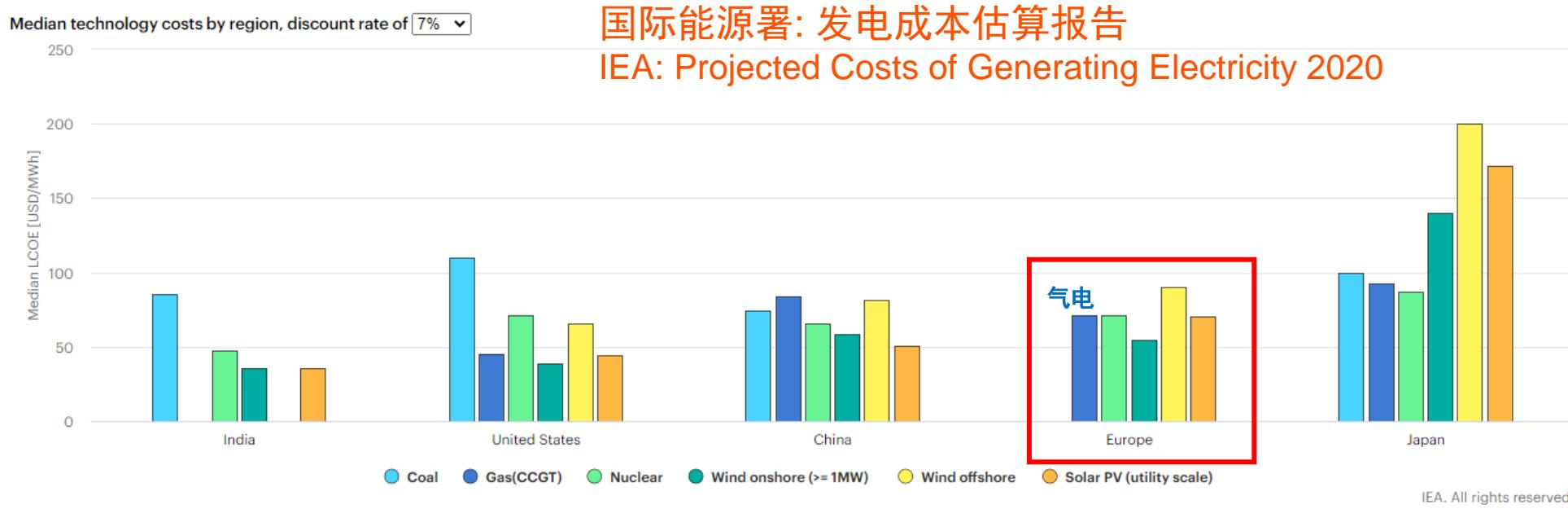
Carbon price reflects abatement costs, and fuel switching is the short term measure that power sector can take to reduce emissions



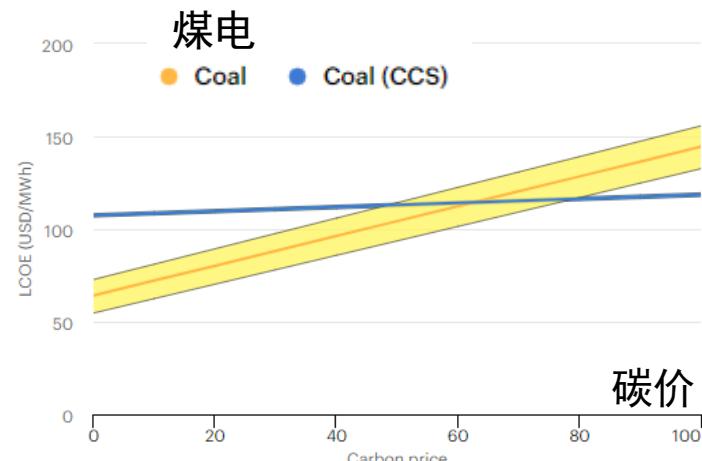
Source: Refinitiv, Exchanges (ICE, EEX)

# 长期来看，碳价提高可再生能源和低碳技术的优势，激励投资

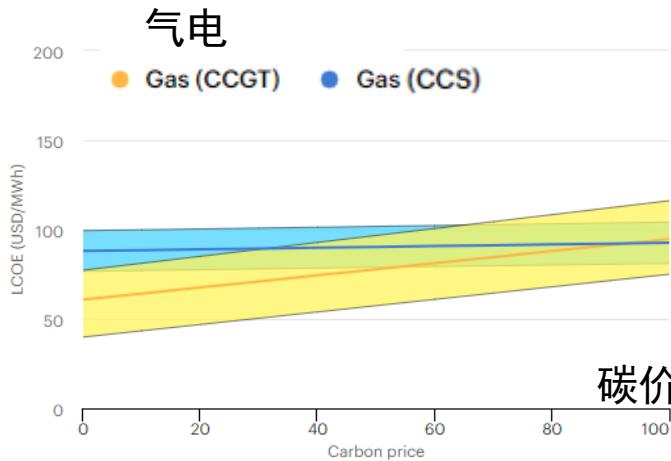
Long term: Carbon price promotes investments in renewables and low carbon technology



LCOE for coal with and without CCUS for various carbon prices

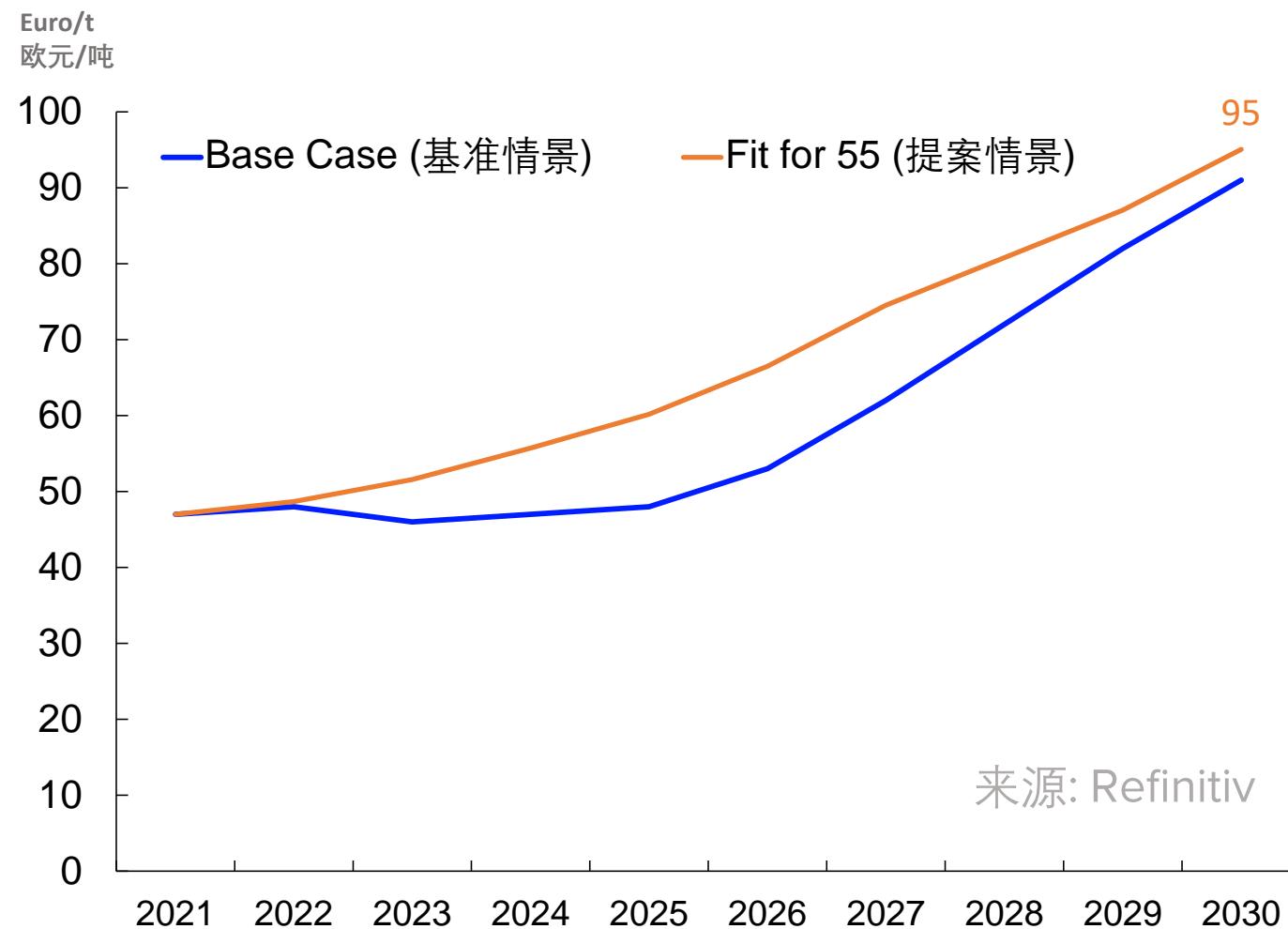


LCOE for gas with and without CCUS for various carbon prices



# 欧盟绿色新政和Fit for 55提案进一步改革碳市场，推升碳价至近百欧元

EU Green Deal and Fit for 55 proposals will strengthen ETS and support carbon price to near 100 euro

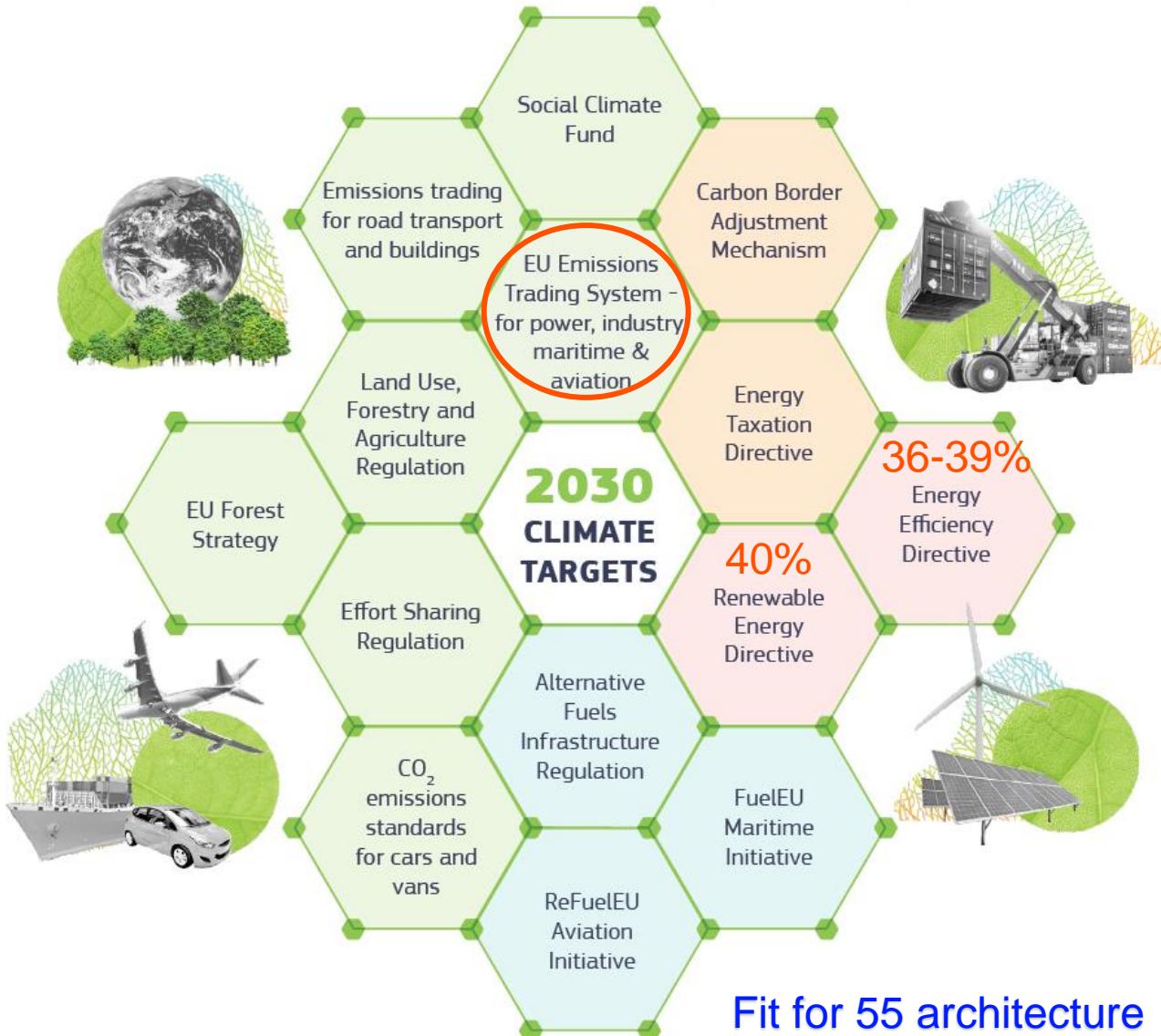


来源: Refinitiv

- 欧盟新的2030气候目标(比2005年减排至少55%)，分解到碳市场覆盖行业为减排61% (包括航运业)
  - 增强市场稳定储备机制(MSR)以保证应对需求侧冲击和保证市场平衡
  - 提议为交通和建筑行业设立单独的碳排放交易体系
  - 提议碳边境调节机制(碳关税)，逐年削减免费配额
- 
- EU 55% climate target breaks down to 61% emissions reduction in ETS sectors (incl. Maritime) in 2030 compared to 2005 emissions
  - A stronger Market Stability Reserve to ensure a balanced market as decarbonization speeds up (...and to shield the EU ETS from overlapping policies).
  - Separate ETS for transport and buildings – due to different abatement cost profiles
  - A gradual phase out of free allocation with a moderate CBAM proposal (...to gain support from affected industries)

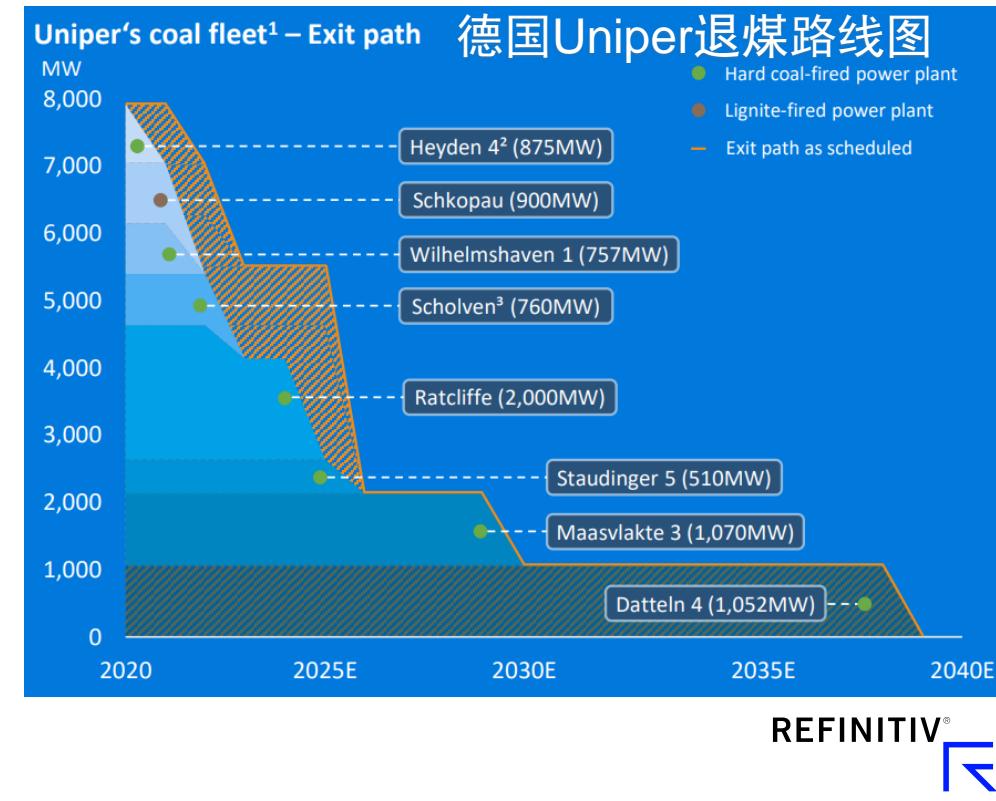
# 碳市场需要和其他能源气候政策相互结合，包括退煤，碳税等

Carbon market need to integrate with other energy policies too including renewables target, coal phase out, carbon tax etc.



欧盟Fit for 55提案提出了更高的2030年可再生能源和能效目标

Fit for 55 package proposed higher renewables and energy efficiency targets for 2030



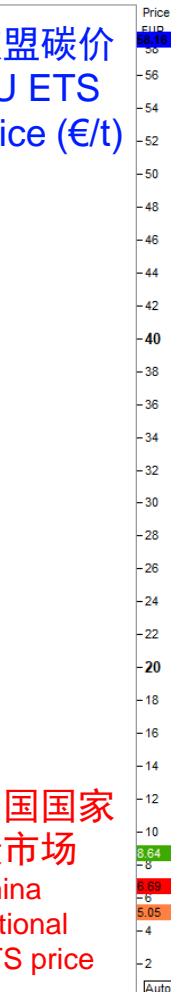
# 中国国家碳市场2021年启动，目前碳价在50元每吨的水平

China national carbon market launched in 2021, allowance price 50 CNY/t (€6.5/t)

Daily CFI2Zc1, SAXCEA, BGXBKA, CEEGDEA

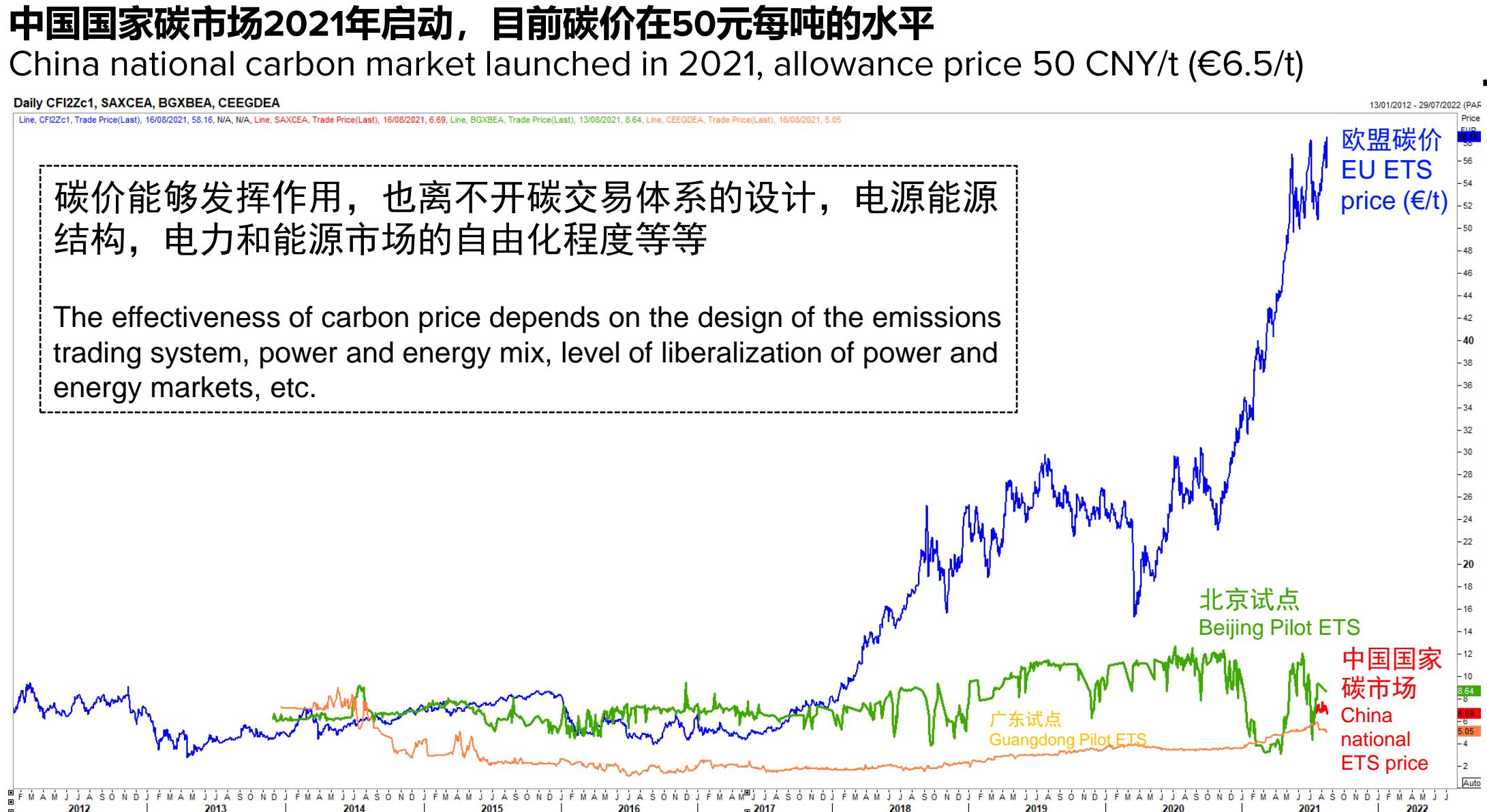
Line, CFI2Zc1, Trade Price(Last), 16/08/2021, 58.16, N/A, N/A, Line, SAXCEA, Trade Price(Last), 16/08/2021, 6.69, Line, BGXBKA, Trade Price(Last), 13/08/2021, 8.64, Line, CEEGDEA, Trade Price(Last), 16/08/2021, 5.05

13/01/2012 - 29/07/2022 (PAF)



碳价能够发挥作用，也离不开碳交易体系的设计，电源能源结构，电力和能源市场的自由化程度等等

The effectiveness of carbon price depends on the design of the emissions trading system, power and energy mix, level of liberalization of power and energy markets, etc.



# 总结 Summary



- 欧盟碳市场自2005年启动以来，推动了电力行业排放量下降
  - 碳价在短期内推动电力市场燃料转换，以及提高清洁能源的相对优势，激励长期投资
  - 欧盟的长期气候目标和市场稳定储备机制支撑了碳价，使其能够发挥信号
  - 碳市场需要和其他政策相互结合，包括可再生能源和能效目标，退煤，碳税等
- 
- EU ETS launched in 2005 and have contributed to reduce European power sector's emissions
  - Carbon price can drive fuel switching in power market in short term, and improve competitive advantages of clean energy, incentivizing long term investments
  - The EU's long term climate goal and Market Stability Reserve mechanism support carbon price
  - Carbon market need to integrate with other energy and climate policies, including renewables and energy efficiency, coal phase-out, carbon tax, etc.

# 谢谢 Thank you!



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