ACCOUNTING AND ALLOWANCES: TO DEVELOP A COMPLIANCE STRATEGY

B-PMR SHANGHAI MISSION

CHARLIE CAO  曹晓磊

2013/10/23
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合规战略开发案例分析：中国电力行业
ACCOUNTING: TO UNDERSTAND YOUR CARBON LIABILITY
核算：摸清你的“碳债”

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<th>WHY TO ACCOUNT? 为什么？</th>
<th>WHAT TO ACCOUNT? 做什么？</th>
<th>HOW TO ACCOUNT? 怎么做？</th>
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<td>• Emissions trading 碳排放权交易</td>
<td>• GHG coverage 温室气体范围</td>
<td>• Data collection 数据收集</td>
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<td>• Tax implications 税收影响</td>
<td>• Emissions scope 排放范围</td>
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<tr>
<td>• Financial reporting 财务报告影响</td>
<td>• The boundaries 核算界限</td>
<td>• Calculation tools 计算工具</td>
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*Accounting is the base for allowance allocation and management*  
核算是配额分配与管理的基础
ALLOWANCE MANAGEMENT: TO DEVELOP A COMPLIANCE STRATEGY
配额管理：开发你的合规战略

THE EXECUTION PROCESS WILL DIFFER DEPENDING ON THE SIZE AND TYPE OF BUSINESS, BUT ALL COMPANIES WILL NEED TO FORECAST THEIR LIABILITY
战略执行过程取决于企业规模和类型，但所有企业都需要摸清和预测自己的“碳债”

• Market horizon 市场远见
• Policy uncertainty 政策不确定性
• Cost pass through 成本转嫁
• Investment planning 投资规划
• Hedging 风险对冲
• Speculation 投机性交易
ALLOWANCE MANAGEMENT: PRICING FORECAST IS KEY
配额管理：价格预测是关键

THE AIM FOR COMPANIES IS TO MINIMISE OVERALL COMPLIANCE COSTS PROVIDING ALL OF THE VARIOUS COMPLIANCE OPTIONS AVAILABLE
利用各种合规机制，最小化合规成本

- Allowances 配额
- Offsets 抵消额
- Abatement 减排
  - Operational 运营减排
  - Long-term 长期减排
THE AIM FOR COMPANIES IS TO MINIMISE OVERALL COMPLIANCE COSTS PROVIDING ALL OF THE VARIOUS COMPLIANCE OPTIONS AVAILABLE

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Forecasts the carbon price for allowances and offsets is key to managing allowances

碳价预测是配额管理的关键
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   合规战略开发案例分析：中国电力行业
WHAT DRIVES THE CARBON PRICING?

什么因素在驱动碳价？

ICE ECX EMISSION Dec 13

Source: Bloomberg
Carbon prices are determined by a complex interaction of economic, political, technological and carbon-specific drivers – all of which need consideration when forecasting the cost of emitting carbon.

### Drivers
- **Energy economics**
  - Power demand
  - GDP growth
  - Renewables costs
  - Fuel costs
  - Exchange rates
  - Business cycles
- **Technology**
  - Emissions abatement technologies
  - Energy efficiency
  - Electric vehicles
  - Smart meters
  - Smart grid
  - Energy storage
  - New technologies
  - CCS
- **Policy**
  - Direct emissions regulation
  - Energy policy
  - Energy efficiency policy
  - Nuclear new build
  - Government revenue needs
  - Renewables policy
  - Carbon market intervention
  - Energy security
- **Carbon pricing**
  - Carbon targets
  - Tax vs. trading system
  - Sectoral coverage
  - Offset rules
  - Linkages to other ETS
  - Hedging strategy
  - Industry advocacy
  - International agreements

### Examples
- **Energy economics**
  - Global coal prices fall
  - Solar cell overcapacity leads to falling solar costs
- **Technology**
  - A breakthrough invention leads to cheaper energy storage
  - Smart meter roll-outs reduce power demand
- **Policy**
  - Nations legislate nuclear phase-outs
  - Energy efficiency requirements
  - Minimum standards for thermal plants
- **Carbon pricing**
  - EU and Australia link carbon trading schemes
  - EU curbs access to international offsets

Source: Bloomberg New Energy Finance
IMPACT OF CARBON PRICING ON DIFFERENT COMPANIES

碳价对不同类型企业的影响

Common power sector concerns

• Long-term stability
• Capital intensive businesses like utilities tend to demand predictable financing costs
• Significant existing exposure to uncertain commodity markets

Utilities with…

...many carbon-intensive thermal plants
Carbon prices tend to devalue these assets and narrow profit margins

...many renewable assets
May be less sensitive to carbon pricing as producers with large renewable exposure typically have other revenue sources beyond power sales (i.e. subsidies, RECs, etc)

...a large nuclear fleet
Carbon pricing typically boosts competitiveness of low-carbon generation

Typically benefit from low carbon prices

Typically benefit from high carbon prices
IMPACT OF CARBON PRICING ON BUSINESS OPERATIONS

碳价对企业运营的影响

- **Investment decisions**
  - Carbon pricing impacts profitability calculations
  - Market-driven carbon pricing increases long-term uncertainty

- **Capital raising**
  - Investors may demand risk premiums for carbon exposure
  - Shareholders may prefer risk mitigation through carbon hedging

- **Dispatching**
  - Carbon pricing can affect the merit order (of operating profitability)
  - This can move plants in or out of the money and impact if and when plants run

- **Sales/ marketing tactics**
  - Retail prices can differ from wholesale power prices. Fluctuating carbon prices need to be considered in retail offerings
  - Carbon intensive utilities may come under public pressure from activist groups

- **Maintenance planning**
  - Plant usage changes if carbon prices affect the merit order. This can shorten or extend maintenance cycles

- **Back-office and accounting**
  - Carbon exposure needs to be allocated internally to incentivize optimal management (ie. between the generation and retail business units)
### CORPORATE REACTION TO THE UNCERTAINTY IN CARBON MARKETS

<table>
<thead>
<tr>
<th>Mature carbon markets</th>
<th>Short term (next 5-10 days)</th>
<th>Medium term (next 1-5 years)</th>
<th>Long term (5+ years ahead)</th>
</tr>
</thead>
</table>
| • Active trading and portfolio optimization | • Forward purchases of carbon as part of power sales hedging  
  • Offset origination (if possible) | • Advocacy in favour of stable, predictable carbon prices  
  • Adjust generation fleet |  |
| Carbon markets in planning | • Active involvement in detail of policy and regulation development process | • Advocacy in favour of stable, predictable carbon prices  
  • Consider shadow carbon pricing in investment decisions |  |
## Business Unit

### Short-term (5-10 days)
- Daily trading

### Medium-term (1-5 yrs)
- Compliance
- Product sales

### Long-term (+5 years)
- Investment planning
- Risk management

## Market Drivers

### Short-term (5-10 days)
- News
- Commodity markets
- Technicals

### Medium-term (1-5 yrs)
- Timing of supply and demand into the secondary market

### Long-term (+5 years)
- Supply and demand fundamentals

## Forecast Output

### Short-term (5-10 days)
- Price direction and volatility

### Medium-term (1-5 yrs)
- Impact of key market events

### Long-term (+5 years)
- Absolute price level

## Tools

### Short-term (5-10 days)
- Correlations

### Medium-term (1-5 yrs)
- Medium-Term-Model (MTM)

### Long-term (+5 years)
- Global Energy & Emissions Model (GE2M)
SHORT-TERM CARBON PRICING
短期碳价

EUA PRICE MOVEMENTS OVER THE LAST MONTH (€/T)
EUA上月价格变动

Related Index Indicators (Start Date = 100)
相关指数的变动

Source: Bloomberg New Energy Finance

Source: Bloomberg New Energy Finance
MID-TERM CARBON SUPPLY AND DEMAND BALANCE, 2010-16E (MT/MONTH)

碳市场的中期供给与需求

Source: Bloomberg New Energy Finance
LONG-TERM CARBON SUPPLY AND DEMAND BALANCE, 2008-28E (MT/YR)

Source: Bloomberg New Energy Finance
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The analysis uses Bloomberg New Energy Finance’s proprietary model of the energy system and clean energy technologies – the Global Energy and Emissions Model (GE²M) – together with expert interpretation of current and proposed policies and targets.
### KEY ASSUMPTIONS OF CHINA’S POWER SECTOR’S ETS

#### 中国电力行业碳排放权交易机制的关键假设

<table>
<thead>
<tr>
<th>Element</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trading phase</strong></td>
<td>2017-30</td>
</tr>
<tr>
<td><strong>Carbon intensity reduction targets &amp; emissions caps</strong></td>
<td>- Emissions caps (MtCO2e) will be translated from carbon intensity reduction targets (tCO2e per unit of output)&lt;br&gt;- Carbon intensity reduction targets have been or will be set for the following three periods</td>
</tr>
<tr>
<td><strong>Period</strong></td>
<td><strong>Base year</strong></td>
</tr>
<tr>
<td>2011-15</td>
<td>2010</td>
</tr>
<tr>
<td>2016-20</td>
<td>2005</td>
</tr>
<tr>
<td>2021-30</td>
<td>2005</td>
</tr>
<tr>
<td><strong>GHG coverage</strong></td>
<td>CO2</td>
</tr>
<tr>
<td><strong>Emissions scope</strong></td>
<td>Direct emissions from energy combustion</td>
</tr>
<tr>
<td><strong>Technology coverage</strong></td>
<td>• Coal: conventional, subcritical, supercritical and ultra-supercritical plants&lt;br&gt;• Gas: OCGT and CCGT plants&lt;br&gt;• All oil plants</td>
</tr>
<tr>
<td><strong>Allocation</strong></td>
<td>• Allowances will be allocated on installation level&lt;br&gt;• 100% of allowances will be allocated for free before 2020&lt;br&gt;• The free allocation percentage will be reduced by 10% per year post 2020&lt;br&gt;• New entrants will be covered and the newly closed plants can obtain 50% of allowances</td>
</tr>
<tr>
<td><strong>Pass-through rate of freely allocated credits</strong></td>
<td>• The regulators will not completely ease the control of retail electricity prices despite carbon pricing mechanisms until 2030&lt;br&gt;• The government will make up for 50% of the carbon costs through subsidies until 2025</td>
</tr>
<tr>
<td><strong>Offsets</strong></td>
<td>• Offsets may be used for up to 10% of compliance obligations&lt;br&gt;• Only domestic offsets generated from renewable power generation technologies can be used in the scheme&lt;br&gt;• Credits can be created one-to-one for solar and wind generation, but 50% discount for biomass and waste-to-energy generation and 85% discount for hydro generation</td>
</tr>
<tr>
<td><strong>Banking &amp; borrowing</strong></td>
<td>• Unlimited banking of allowances between compliance years is permitted&lt;br&gt;• Borrowing is prohibited</td>
</tr>
<tr>
<td><strong>Linkage</strong></td>
<td>• No linkage assumed to other trading schemes</td>
</tr>
</tbody>
</table>

Source: Bloomberg New Energy Finance
EMISSIONS AND ABATEMENT DEMAND, 2010-30E (MTCO2E)

碳排放情景与减排需求

Source: Bloomberg New Energy Finance
MARGINAL ABATEMENT COST CURVE OF CHINA’S POWER SECTOR, 2030E

2030年中国电力行业的边际减排成本曲线

Source: Bloomberg New Energy Finance
CARBON PRICING FORECAST OF CHINA’S POWER SECTOR ETS, 2017-30E

中国电力行业碳排放权交易机制碳价预测

Source: Bloomberg New Energy Finance
IMPACT OF ETS ON GENERATION CAPACITY ADDITIONS, 2013-30E (GW)
碳交易对电力新增装机的影响

Source: Bloomberg New Energy Finance
**IMPACT OF ETS ON POWER GENERATION & CAPACITY**

碳交易对电力行业装机及发电结构的影响

### POWER GENERATION CAPACITY MIX UNDER DIFFERENT SCENARIOS, 2012 VS. 2030E (%, GW)

<table>
<thead>
<tr>
<th>Year</th>
<th>Traditional Territory</th>
<th>New Normal</th>
<th>Barrier Busting</th>
<th>BB+ETS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>1,124</td>
<td>2,675</td>
<td>2,707</td>
<td>2,766</td>
</tr>
<tr>
<td>2030:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional</td>
<td>67%</td>
<td>54%</td>
<td>58%</td>
<td>52%</td>
</tr>
<tr>
<td>New Normal</td>
<td>20%</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>Barrier</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>BB+ETS</td>
<td></td>
<td>2%</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>

- Geothermal
- Waste
- Biomass
- STEG
- SPV - distributed
- SPV - utility
- Wind offshore
- Wind onshore
- Hydro
- Nuclear
- Oil
- Gas
- Coal

Source: Bloomberg New Energy Finance

Note: Pumped hydro excluded.

### POWER GENERATION MIX UNDER DIFFERENT SCENARIOS, 2012 VS. 2030E (%, TWH)

<table>
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<tr>
<th>Year</th>
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<th>Barrier Busting</th>
<th>BB+ETS</th>
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</thead>
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<tr>
<td>2012</td>
<td>4,841</td>
<td>10,259</td>
<td>10,259</td>
<td>10,259</td>
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<tr>
<td>2030:</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Traditional</td>
<td>72%</td>
<td>54%</td>
<td>58%</td>
<td>56%</td>
</tr>
<tr>
<td>New Normal</td>
<td>17%</td>
<td>9%</td>
<td>10%</td>
<td>11%</td>
</tr>
<tr>
<td>Barrier</td>
<td>3%</td>
<td>2%</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>BB+ETS</td>
<td></td>
<td>2%</td>
<td>1%</td>
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Source: Bloomberg New Energy Finance

Note: Pumped hydro excluded.
IMPACT OF ETS ON POWER SECTOR INVESTMENTS

TOTAL CAPITAL INVESTMENT REQUIREMENTS FOR POWER GENERATION CAPACITY ADDITIONS UNDER DIFFERENT SCENARIOS, 2013-30E ($BN)

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<th>New Normal</th>
<th>Barrier Busting</th>
<th>BB+ETS</th>
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<tr>
<td>Waste</td>
<td>2,714</td>
<td>2,863</td>
<td>3,033</td>
<td>3,256</td>
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<tr>
<td>Biomass</td>
<td>223</td>
<td>225</td>
<td>255</td>
<td>296</td>
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<tr>
<td>STEG</td>
<td>131</td>
<td>137</td>
<td>202</td>
<td>273</td>
</tr>
<tr>
<td>SPV - distributed</td>
<td>309</td>
<td>354</td>
<td>375</td>
<td>434</td>
</tr>
<tr>
<td>SPV - utility</td>
<td>297</td>
<td>297</td>
<td>298</td>
<td>298</td>
</tr>
<tr>
<td>Wind offshore</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wind onshore</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydro</td>
<td>1,092</td>
<td>1,092</td>
<td>1,092</td>
<td>1,092</td>
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<tr>
<td>Nuclear</td>
<td>100</td>
<td>316</td>
<td>317</td>
<td>255</td>
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<tr>
<td>Gas</td>
<td>316</td>
<td>317</td>
<td>317</td>
<td></td>
</tr>
<tr>
<td>Coal</td>
<td>70</td>
<td>317</td>
<td>317</td>
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</tr>
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Addition Investment Requirements for Supporting Infrastructure Under Different Scenarios, 2013-30E ($BN)

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</thead>
<tbody>
<tr>
<td>Waste</td>
<td>1,001</td>
<td>1,024</td>
<td>1,055</td>
<td>1,123</td>
</tr>
<tr>
<td>Biomass</td>
<td>53</td>
<td>56</td>
<td>59</td>
<td>65</td>
</tr>
<tr>
<td>STEG</td>
<td>164</td>
<td>166</td>
<td>174</td>
<td>192</td>
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<tr>
<td>SPV - distributed</td>
<td>355</td>
<td>360</td>
<td>364</td>
<td>375</td>
</tr>
<tr>
<td>SPV - utility</td>
<td>429</td>
<td>442</td>
<td>458</td>
<td>491</td>
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<tr>
<td>Wind offshore</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Wind onshore</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydro</td>
<td>429</td>
<td>442</td>
<td>458</td>
<td>491</td>
</tr>
<tr>
<td>Nuclear</td>
<td>429</td>
<td>442</td>
<td>458</td>
<td>491</td>
</tr>
<tr>
<td>Gas</td>
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Source: Bloomberg New Energy Finance
Note: Pumped hydro excluded.

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CHINA’S POWER SECTOR’S EMISSIONS, 2010-30E (MTCO2E)

中国电力行业的碳排放情景

Source: Bloomberg New Energy Finance
CHINA’S POWER SECTOR’S EMISSIONS, 2010-30E (MTCO2E)

中国电力行业的碳排放情景

Source: Bloomberg New Energy Finance
CHINA’S POWER SECTOR’S EMISSIONS, 2010-30E (MTCO2E)

中国电力行业的碳排放情景

Source: Bloomberg New Energy Finance
To develop a compliance strategy for your company

开发您的合规战略
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