Centre for Energy and Environmental Markets

UNSW THE UNIVERSITY OF NEW SOUTH WALES SYDNEY • AUSTRALIA



Overview of CEEM Emissions Trading Design Research

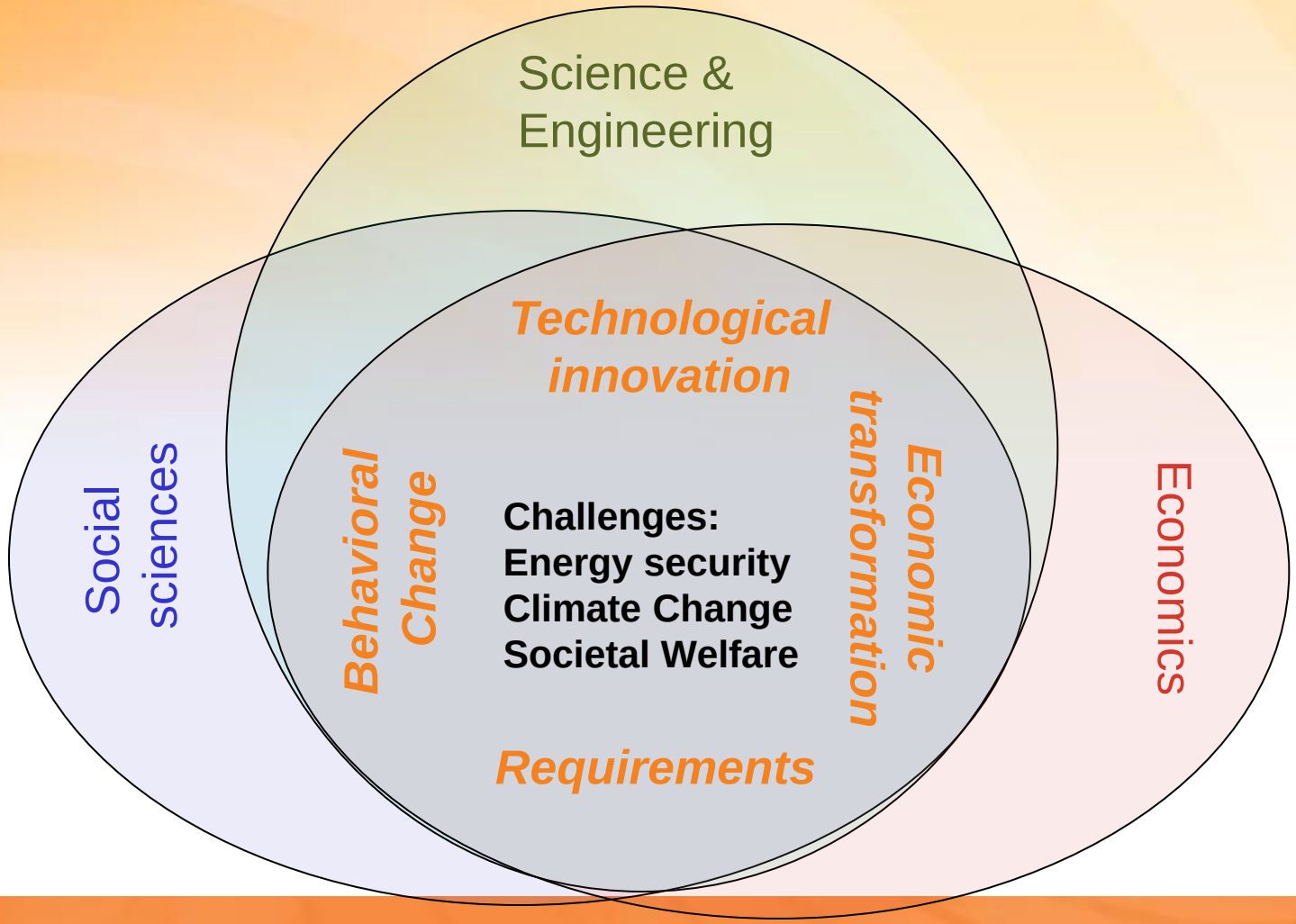
CEEM China- Australia Carbon Market Design Expert Workshop

Dr. Regina Betz, CEEM

Centre for Energy and Environmental Markets facts

- Established in 2004
- Interdisciplinary Centre including reserachers from faculty of Engineering, Business, Social Sciences, Environmental Sciences, Built environment ,Law ….
- Staff: 2 Joint Directors, 7 Research coordinators for each faculty, 3-5 Post-docs and around 10 PhDs
- Core tasks: Research, education and policy impact

Key interdisciplinary perspectives & tools required to address challenges – CEEM's unique strength



CEEM works in the areas of

- Energy markets
  - spot, ancillary services and derivative markets, retail markets
  - primary focus on the Australian National Electricity Market
- Energy related environmental markets
  - E.g. **Emissions Trading Systems (ETS)**, Renewable Energy Certificate Market, Energy Efficiency Certificate Trading, Renewable energy subsidies…
- Broader policy frameworks and instruments to achieve desired societal energy and environmental outcomes
- **Future: Work with Chinese University Partners on Climate and Energy policy in China**

CEEM ETS Research: Main Methods

Methods to test design *before* ETS introduction

- Theoretical Analysis
- Simulations
- Experiments

Methods to evaluate design *after* ETS implementation

- Data Analysis based on European Union CITL Data

排放交易计划实施前，机制设计的测试方法

- 理论分析
- 模拟仿真
- 实验

排放交易计划执行后，机制设计的评价方法

- 数据分析

（基于欧盟 CITL数据）

CEEM ETS Research

Experiments

- Compliance mechanism
- Auction design
- Market design
- Monitoring, reporting, and verification

实验

- 规则遵守的机制设计
- 拍卖机制设计
- 市场机制设计
- 监测，报告和审核设计

Data Analysis (EU ETS)

- Coverage
- Winners and losers
- Role of banks

数据分析（欧洲排放交易机制）

- 政策的覆盖范围
- 政策的赢家和输家
- 银行的角色

Compliance mechanisms: Experiment

Theory:

- When the penalty is higher than market price of permits, firms will choose to be compliant.

Research question:

- Will penalty design have effect on compliance rates and market performance?

Sanction types

- Fixed penalty rate, make-good provision, mix of both
- Level: independent, or related to permit price

Results

- Contradicts theory
- Trade-off: make-good provision higher compliance but lower efficiency than fixed penalty

理论依据：

- 当罚金高于市场交易价格，企业会选择遵守规则。

研究问题：

- 处罚的机制设计会对遵守规则的比率和市场的业绩有影响吗？

奖惩类型

- 固定的处罚额度，履行职责的奖励，两者相结合
- 标准：独立设置，或者与市场价格关联

结论

- 与理论相矛盾
- 权衡：相对于固定处罚，履行职责的奖励有更高的遵守比率但是效率相对更低

Restiani, Phillia and Betz, Regina 2010, The Effects of Penalty Design on Market Performance: Experimental Evidence from an Emissions Trading Scheme with Auctioned Permits, EERH Research Report No.87

Auctioning of allowances: Experiment

Reseach question:

- How to design an efficient auction for Australian carbon market, when more than one vintage is auctioned?

Method:

- Experimental testing of different auction formats:
  -simultaneous vs. sequential,
  -sealed bid vs. open clock

Results:

- Sequential auctions are not worse than simultaneous auctions and outperform simultaneous auction in a sealed bid setting. No difference in revenue or price discovery betweem auction type.

Coverage: Simulation and data analysis

Theory:

- Broader coverage will make emissions trading more efficient, because more variety in mitigation costs.

Research question:

- What are the costs and benefits of covering companies in an ETS compared to an alternative policy, taking transaction costs into account?

Transaction costs

- Trading costs, monitoring, reporting, and verification costs…

Results

- Efficient coverage depends on cap stringency, transaction costs, and distribution of mitigation costs
- Trading costs may prevent participation (Analysis of expired EUAs)
- Phase-in of sectors may be efficient

理论依据：

- 因为减排成本的多样化，更宽泛的覆盖范围会使得排放交易的效率更高。

研究问题：

- 就交易成本而言，与其他政策相比，对于包括在排放交易计划中的企业，它们的成本和收益分别都是什么？

交易成本

- 买卖成本、监测、报告和审核成本

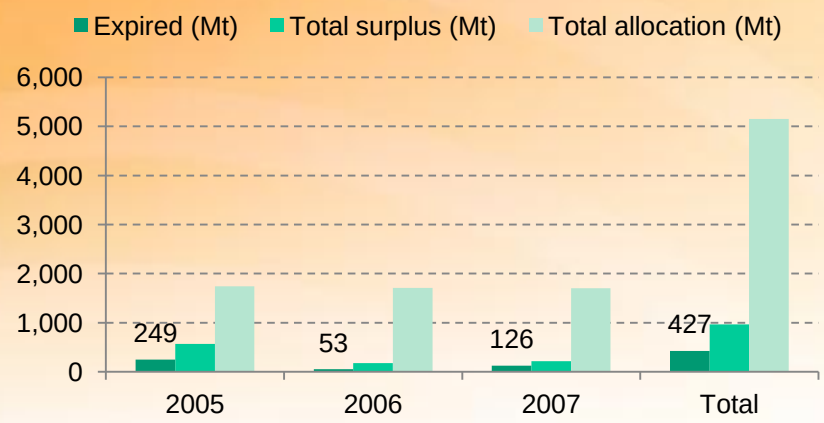
结论

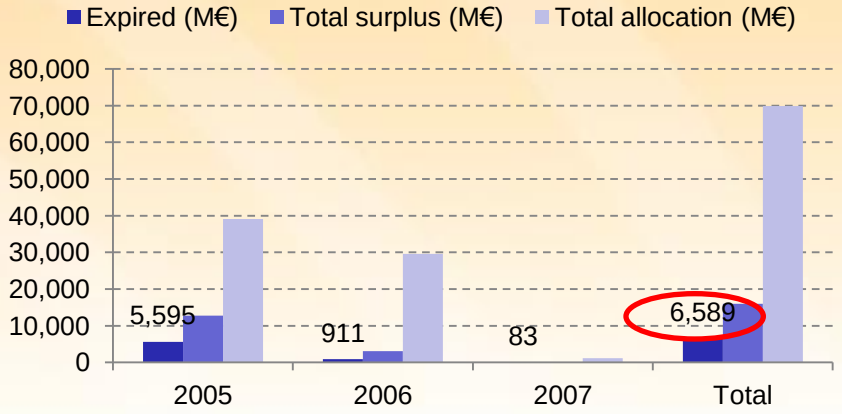
- 有效率的实施范围取决于总体限制的严格程度、交易成本和减排成本
- 买卖成本或许会限制交易的参与
  （基于对早前欧盟配额的分析）
- 行业的逐渐引进或许是有效的

Betz, Regina / Sanderson, Todd / Ancev, Tihomir 2010, In or out: Efficient inclusion of installations in an Emissions Trading Scheme?, *Journal of Regulatory Economics,* vol. 37, Issue 2, pp 162-179.

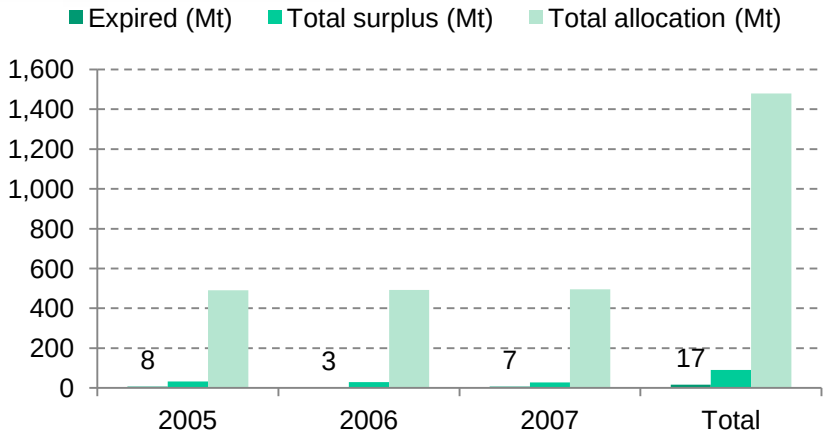
Overall Expired EU Allowances (EUAs)

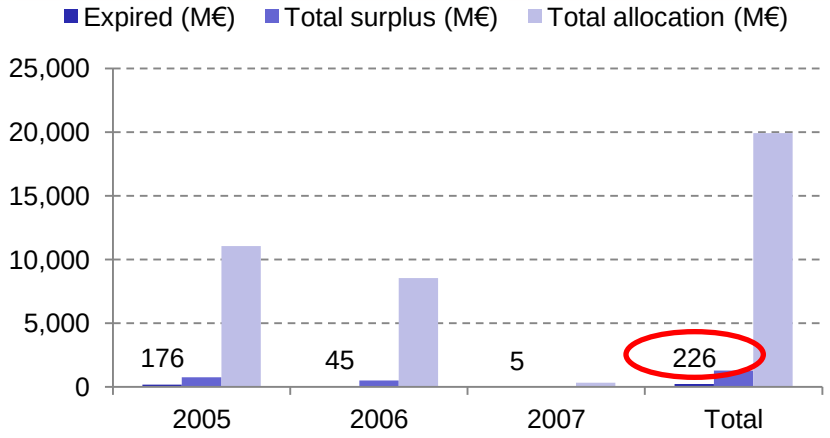
Installations





German companies





Source: Own calculations based on CITL data

Trading Costs per Installation/Firm

	Aggregate Trading Costs (M€)	Installations that did not trade	Per installation (€)	Aggregate Trading Costs (M€)	German firms that did not trade	Per German firm (€)
upper bound (individual years, yearly prices)	6,589	7,912	832,828	226	702	322,001
middle bound (all years, yearly prices)	2,600	3,111	835,770	62	264	235,698
middle bound (all years, 2005-07 av. price)	2,092	3,111	672,492	66	264	248,542
lower bound (all years, 2007 av. price)	102	3,111	32,877	3	264	12,151

- Very high as compared to bottom-up studies
- There might be additional factors that inhibit trade, e.g. uncertainty

Source: Own calculations based on CITL data

Transfer patterns using cluster analysis

Transfer pattern	Passive	Medium Active	Acquiring	Partnering	Highly Active	Conti-nuous	Future Clearing
Total transfer volume [Million EUAs]	290	14,742	18,526	37,776	97,480	78,368	221,464
Net transfer volume [Million EUAs]	-38	382	7,526	1,016	332	19,147	0.0
Transfers relative to allocation	97	14,384	12,448	37,776	97,480	78,368	221,464
Number of accounts transferred from	1.11	34.82	11.78	121.55	50.29	37.20	24.00
Number of accounts transferred to	1.25	20.68	6.90	67.00	41.43	30.80	23.00
Discontinuity of transfers	2.40	1.36	1.74	1.03	1.36	1.06	1.74
No. of accounts	7,212	78	41	11	7	5	1
% of total accounts	98.06%	1.06%	0.56%	0.15%	0.10%	0.07%	0.01%

New CEEM Project: The Rise of Carbon Markets in China

Aim:

- Foster collaboration between CEEM and universities in China working on carbon market design

Process:

- Exchange of researchers and postgraduates
- Set up working groups on different design elements
- Host two symposia in China, one jointly with Fudan, and another in Beijing

Potential topics:

- Electricity production
- State-owned companies
- Allocation rules for new entrants

目的：

- 促进能源与环境市场中心与中国从事碳市场设计的大学的合作

进程：

- 学者与研究生交换
- 根据不同设计要素建立研究组
- 分别在中国北京和上海主办两场学术研讨会

可能的研究课题

- 电力生产企业的实施范围
- 国有企业
- 市场新进入者的配额分配规则

Carbon Pricing Future in Australia

Likely repeal of „Carbon Tax“ by Abbot and introduction of „emissions reductions fund”, but most likely more expensive.

Compromising line

- Mid June 2014 new elections of half of Senate
- Based on current projection Abbot government will need 6 crossbencher Senators to vote for the repeal

Uncompromising line
Double dissolution

- Possible if the same legislation passed by the lower house is twice rejected by the Senate.
- This may give Abbot majority in Senate since the whole Senate is reelected

Topics for joint collaboration

1. Target setting
2. Coverage
3. Traded Unit
4. Allocation
5. Compensation
6. Market functioning and oversight
7. Price containment
8. Including Offsets
9. Sanctioning
10. Monitoring, reporting and verification
11. Accounting

Centre for Energy and Environmental Markets

UNSW THE UNIVERSITY OF NEW SOUTH WALES SYDNEY • AUSTRALIA

Many of our publications are available at:
www.ceem.unsw.edu.au