Centre for Energy and Environmental Markets

UNSW THE UNIVERSITY OF NEW SOUTH WALES SYDNEY • AUSTRALIA



# Auctioning greenhouse gas emissions permits: How should the auction be designed?

Regina Betz, Peter Cramton, Stefan Seifert, Suzi Kerr

IAEE, Istanbul 2008



Centre for Energy and Environmental Markets

UNSW THE UNIVERSITY OF NEW SOUTH WALES SYDNEY • AUSTRALIA

## Introduction

| | |
|---|---|
| Federal Rudd government (since end 2007) | Green paper to be released in July 2008.<br>Scheme to commence by 2010 |
| Former Howard government | Proposal (June 2007)<br>To commence by 2011/12 |
| Garnaut | Model for discussion (March 2008)<br>Scheme to commence by 2010 |
| NETT | Proposal (Discussion paper 2006 and Final Report December 2007)<br>Scheme to commence by 2010 (if no commitment by Commonwealth Govt to introduce a scheme). |

# Auctioning

| | |
|---|---|
| Federal Rudd government | View to be indicated in green paper |
| Former Howard government | Mixture of auctioning and free allocation: Existing businesses: "one off" allocation based on amount of loss above average economy wide losses and free allocation to trade exposed emissions intensive industries (TEEII) |
| Garnaut | All permits auctioned at regular intervals. Free permit allocation not supported as a means of compensation for changes in income distribution |
| NETT | Mixture of auctioning and free allocation: Existing generators those committed at 3 June 2007: "one off" allocation based on estimated negative effects on profitability and free allocation to trade exposed emissions intensive industries (TEEII) |
| | **Auctioning study, basis for this presentation** |

Centre for Energy and Environmental Markets
UNSW THE UNIVERSITY OF NEW SOUTH WALES SYDNEY • AUSTRALIA

# Auction Objectives according to NETT

- Key objective:
  - Achieve an efficient allocation of permits
    = allocate permits to those who value them most highly
- Facilitate efficiency of ETS system:
  - Reveal market prices of permits to auction participants and non-participants, particularly at early stages
- Revenue maximization:
  - Not a primary goal

# Comments on Key Objectives

- Most permits are *not* allocated by auction
  - ➡ Auction *cannot* ensure efficient allocation of permits
- Significant share of permits is allocated to Trade Exposed Energy Intensive Industry sector (which has a private valuation of zero!)
  - ➡ Initial allocation is highly *inefficient* by construction!
  - ➡ Well functioning secondary markets are crucial!
- Efficiency of ETS requires not only efficient allocation of permits, but efficient investments regarding abatement measures
  - ➡ Early price signals are crucial (time lag!)





# Key Design Elements

## Ascending Clock Auction:

- Auctioneer publishes total available quantity, initial reserve price and further schedule of price offers
- Participants hand in demand bids for the reserve price
- Auctioneer reveals total demand
- As long as total demand > total available quantity auction goes on
- Demand bids cannot increase
- Auction ends when total demand ≤ total supply
- Final price: **uniform pricing:** $p_t$=if total demand = total supply or $p_{t-1}$= if total demand < total supply (normal case)
- All bidders receive their quantity of last round (normal case)
- The remaining supply is allocated proportional according to residual bids at $p_{t-1}$

# Auctioning several vintages

- In some auction events, several vintages of permits will be available
- Different vintages are almost (but not perfect) substitutes
- All vintages are auctioned simultaneously
- For each vintage a separate clock is implemented
- Bidders may shift demand from one clock to another
- At the end of each round, a clock ticks forward if total demand for the respective vintage exceeds supply
- Auction continues as long as at least one clock ticks forward



s1



# Additional Features

## Double auction extension

- Facilitates efficient allocation of permits assigned to TEEI
- Sellers specify supply schedules prior to start

## Proxy bids

- to reduce transaction costs for small participants

## Alternative implementation: Intra-round bids

- Bidders submit demand schedules for all given prices
- May increase efficiency
- Smoothes closing of auction
- Allows for larger increments

Slide 8

s1 Advantages:
Upward sloping demand curve reduces vulnerability to strategic demand reduction and collusion
Suppliers (TEEI companies) profit from lower transaction costs in the auction compared to the secondary market
Price signals are more reliable as both net buyers and net sellers participate in the auction
s3165179, 4/02/2008



# Timing & Frequency

- **Timing**:
  - **First auction** before start of the scheme after first period of monitoring to ensure that necessary information is available
  - **Last auction** of one vintage within reconciliation period to give companies with unforeseeable shortage possibility to buy
  - **Advance auctions**: Future allowances should be made available **three years** in advance of their vintage:
    - to help establishing a future market
    - assist future investments (3 years is lead time for investments)
- **Frequency**

  The auctions should be held **quarterly** :
  - To minimise transaction costs
  - enables both price and quantity risk management

Distribution:

Slightly front-loaded (20% in advance vs. 15% in spot)

Figure 5.3: Timing, frequency and distribution of permits across auctions

| Auction date Year | Qtr | Financial Year of Emission Permit Vintage 10/11 | 11/12 | 12/13 | 13/14 | 15/16 | 16/17 | 17/18 | 18/19 |
|---|---|---|---|---|---|---|---|---|---|
| 2009 | Aug | | | | | | | | |
| | Nov | 20% | | | | | | | |
| 2010 | Feb | | | | | | | | |
| | May | 20% | 20% | | 20% | | | | |
| | Aug | 15% | | | | | | | |
| | Nov | 15% | | | | | | | |
| 2011 | Feb | 15% | | | | | | | |
| | May | 15% | 20% | 20% | | 20% | 4 products available at auction | | |
| | Aug | $s_i$ | 15% | | | | | | |
| | Nov | | 15% | | | | | | |
| 2012 | Feb | | 15% | | | | | | |
| | May | | 15% | 20% | 20% | | 20% | | |
| | Aug | | $s_i$ | 15% | | | | | |
| | Nov | | | 15% | | | | | |
| 2013 after review | Feb | | | 15% | | | | | |
| | May | | | 15% | | 20% | | 20% | |
| | Aug | | | $s_i$ | 15% | | | | |
| | Nov | | | | 15% | | | | |
| 2014 after review | Feb | | | | 15% | | | | |
| | May | | | | 15% | | 20% | | 20% |
| | Aug | | | | $s_i$ | 15% | | | |
| | | | | | | etc | | | |

Source: Evans and Peck 2007



Centre for Energy and Environmental Markets
UNSW THE UNIVERSITY OF NEW SOUTH WALES SYDNEY • AUSTRALIA

# Outlook

**Further work on auction proposal:**

- Test auction format experimentally
- Modify according to change in emissions trading design (share of auctioning, allocation to Trade exposed emissions intensive industry)

**Timetable for ETS of Rudd Government**

- **March – June 2008**: Phase 1 consultations
- **July 2008**: Public release of green paper
- **July – September 2008**: Phase 2 consultations
- **December 2008**: Public release of exposure draft of legislation package
- **December 2008 – February 2009**: Phase 3 consultations on exposure draft legislation package
- **End 2008**: Release of medium term trajectory of the scheme
- **March 2009**: Bill introduced into Parliament
- **Mid 2009**: Government aims to achieve passage of Bill by Parliament

Final Report available:

http://www.emissionstrading.nsw.gov.au/__data/assets/pdf_file/0015/8421/Auction_Design_Report.pdf

Centre for Energy and Environmental Markets

UNSW
THE UNIVERSITY OF NEW SOUTH WALES
SYDNEY • AUSTRALIA

r.betz@unsw.edu.au

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