

# Carbon Emissions Trading Simulation

*Markets by Choice  
...Results by Design*

Questions?

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# Why Simulations?

Simulations can:

- Improve stakeholder ETS literacy
- Build capacity
- Build support for the policy / reduce opposition from stakeholders
- Facilitate the testing of design options
- Reduce ETS roll-out time

Caution - Simulations:

- Provide a simplified model
- May not accurately predict real-life ETS



[World Bank Simulation Report](#)





**China, Korea, Vietnam, Thailand, Japan, India, US, Colombia, Brazil, Mexico, Chile, Europe, Duke, Yale, Columbia, UCSB Bren, UC Santa Cruz, Georgia Tech, Northeastern, Universidad Jesuita de Guadalajara, Universidad de los Andes, University of Queensland, Vrije Universiteit Amsterdam, Saint Ignatius, Pacific Collegiate School**



# PRIZES!



# Key terms

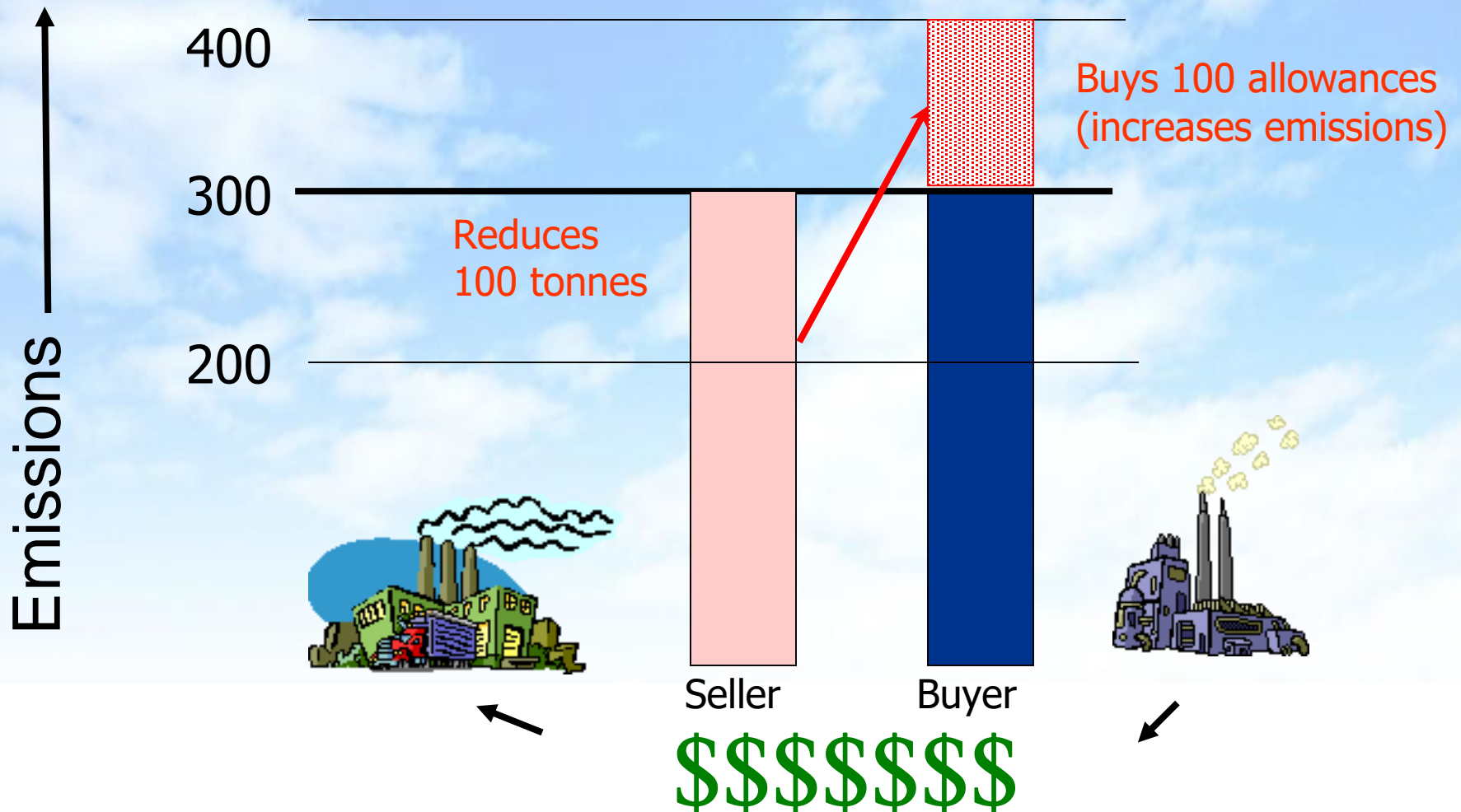
- Compliance vs voluntary market
- Tradeable performance standard
- Emissions limit (cap)
- Emissions trading /cap and trade vs carbon tax
- Compliance obligation
- Compliance instruments
  - Emission allowances
  - Emissions offsets
- Allocation
- Business as usual emissions
- Long/short position
- Marginal abatement control cost curves
- Auction market (primary market)
- Emissions exchange market (secondary market)
- Over-the-counter (OTC) trading market (secondary market)

# ETS Basics – Emissions Limit (Cap)

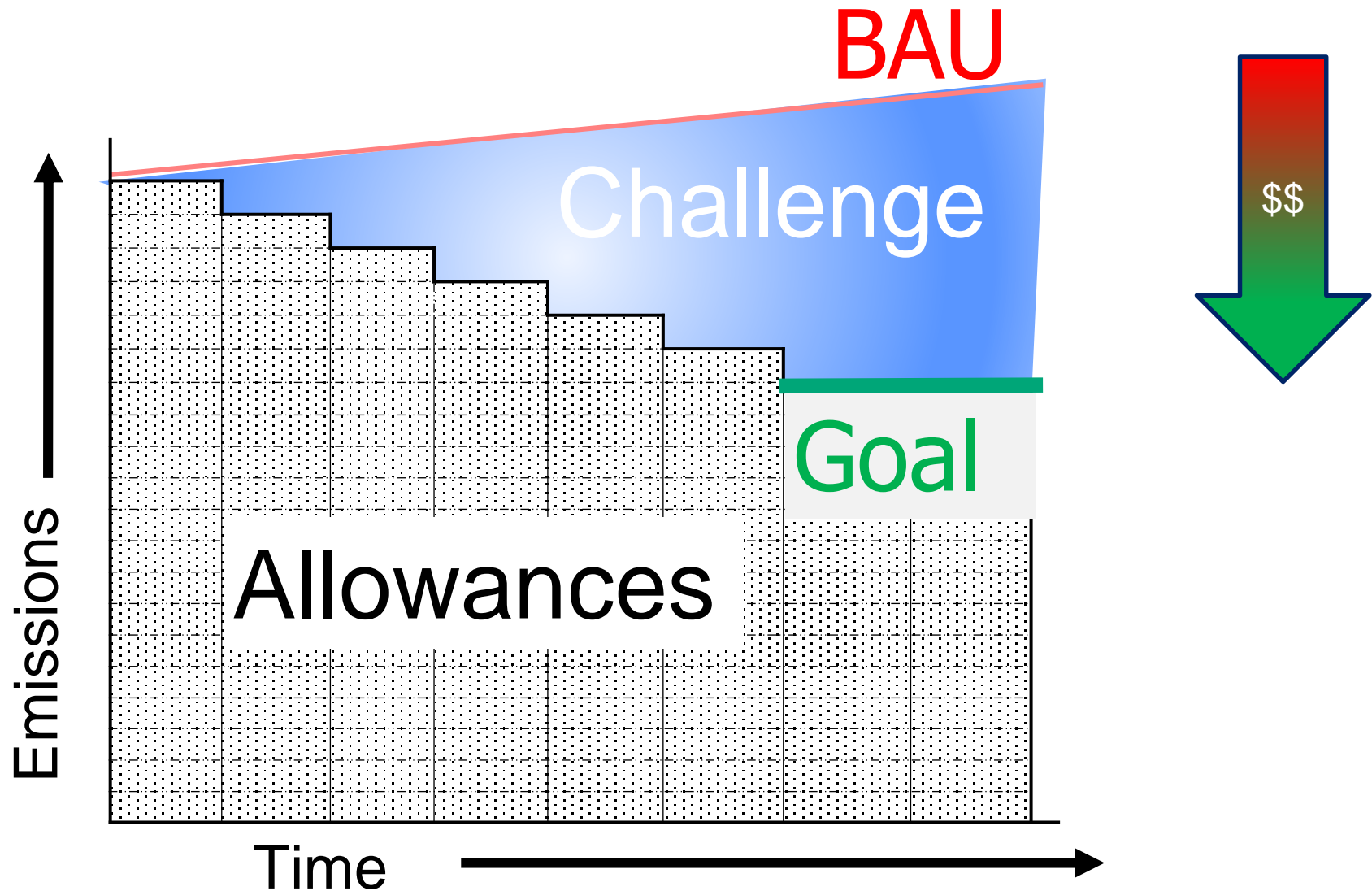




# ETS Basics - Trade



# Objective





# CarbonSim Schedule

YEAR 1, 2, 3 = 20 MINUTES/YR

ABATEMENT

Auction 1  
2:15

2:45

Auction 2  
2:15

2:45

Auction 3  
2:15

2:45

Auction 4  
2:15

2:45

EXCHANGE TRADES

OVER THE COUNTER TRADES

DISCUSSION – QUESTIONS - LESSONS LEARNED

# YOUR OBJECTIVE



In this sim you will run a company that is subject to an ETS and has a shortage of allowances.  
Your mission: *Comply at the lowest possible cost.*



# Choices



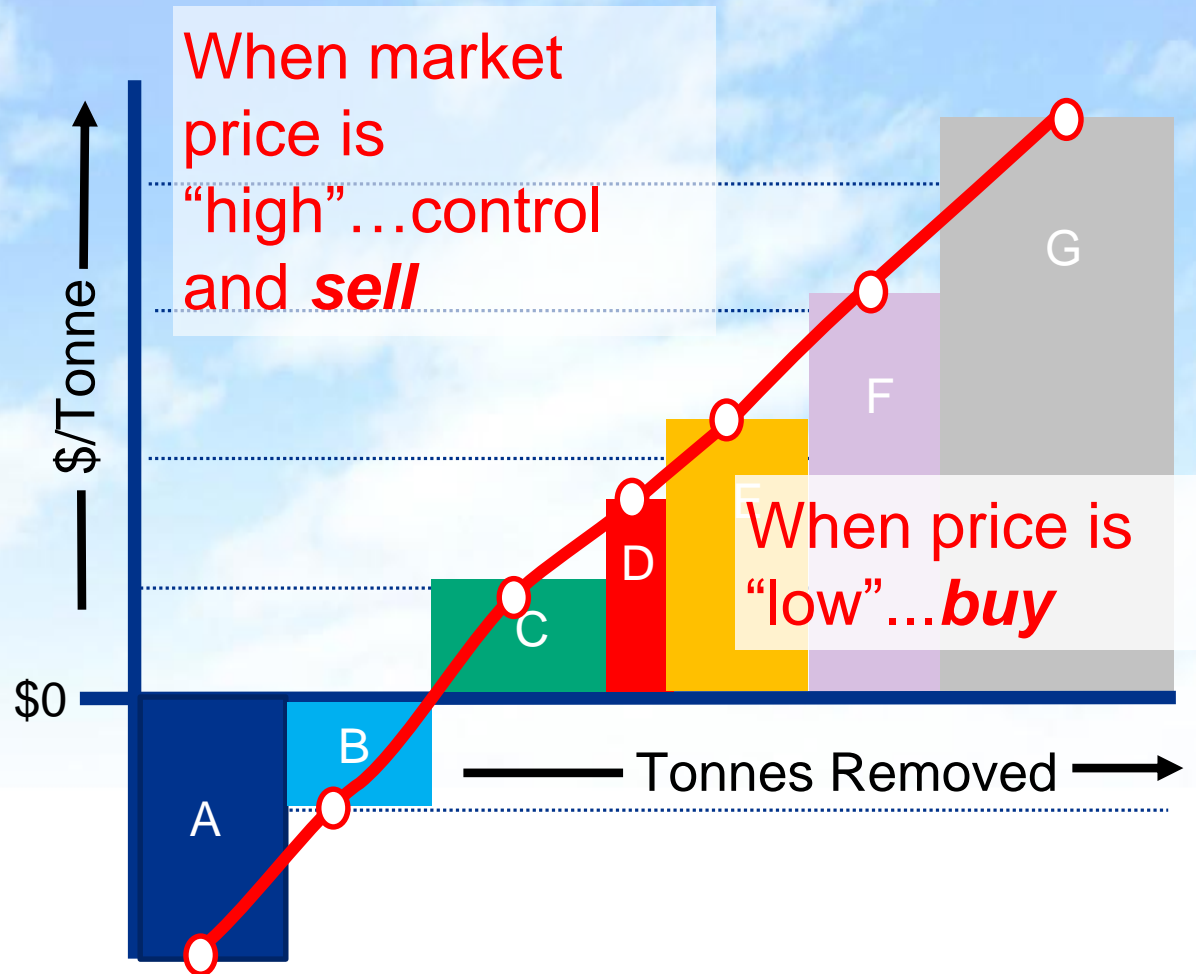




# ETS Basics - Control, Buy, or Sell?

- On-site controls
- No need to trade
- Build time
- Irreversible

## Marginal Abatement Control Cost Curve





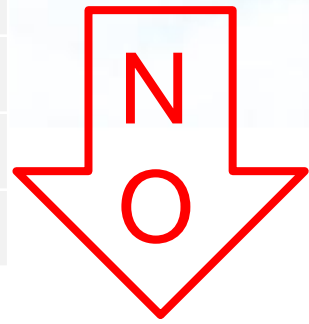
# Auction

Sold  
125,000  
@ \$45

## 125,000 for Auction

Bids	Price (\$/ton)	Quantity (tons)	Aggregate Demand
E	60	15,000	15,000
A	59	10,000	25,000
B	58	10,000	35,000
D	55	20,000	55,000
E	50	20,000	75,000
A	49	20,000	95,000
C	47	5,000	100,000
E	45	25,000	125,000
D	39	10,000	135,000
B	37	25,000	160,000
A	35	40,000	200,000
C	30	20,000	220,000

15,00  
+ 10,000  
+ 10,000  
+ 20,000  
+ 20,000  
+ 20,000  
+ 5,000  
+ 25,000  
= **125,000**



- Sealed bid
- Uniform price
- Price and quantity
- Multiple bids OK
- Winners pay same
- Clearing price = last fill
- Low bids don't trade



# Last Trade

- Multiple buyers, sellers
- Inside bid & offer
- Market depth
- Recent trades
- Anytime\*

Exchange					
Current Market			Last 10 Trades		
	Tonnes	Price	Time	Price	Tonnes
SELLING ↑	30,000	48.90	14.42.10	45.12	10,000
	60,000	48.00	14.41.00	45.12	10,000
	10,000	46.10	14.38.22	45.40	20,000
	5,000	45.25	14.38.01	46.00	15,000
	25,000	45.10	14.37.45	46.25	20,000
BUYING ↓	15,000	45.00	14.36.22	47.00	5,000
	35,000	43.90	14.35.33	47.25	25,000
	15,000	42.10	14.32.52	48.00	10,000
	5,000	42.00	14.10.05	48.10	25,000
	42,000	41.75	14.01.34	48.00	40,000

# Inside Market





## Market Order

Purchase or sell specific quantity **at the then current market price**.

## Limit Order

Set a **minimum sell price** or a **maximum buy price**. Order will only be cleared if the limit price is reached.

## Stop Loss Order

Order will be cleared once the market price reaches the specified level. Sellers (Buyers) can protect their position if the market falls (rises) beyond the order price.

## Partial Fill Order

Order can be filled if less than the entire volume can be sold/bought.

## Immediate or Cancel

(‘Fill or Kill’): An order to buy or sell a specified number of units that is immediately filled. If the order cannot be immediately filled, it is automatically cancelled (killed).



- Single buyer, seller
- Product, price, volume
- Anytime\*

# CarbonSim Schedule

Virtual Year #	Real Time
Survey & Training	45 mins
Year 1	20 mins
Year 2	20 mins
Year 3	20 mins
Wrap up & Award Ceremony	

Each and Every Year

Abatement



**Auction 1**

*Interim*

**Auction 2**

*Interim*

**Auction 3**

*Interim*

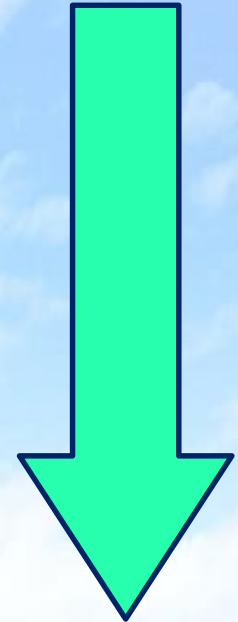
**Auction 4**

*Interim*

Exchange



OTC



Need help?

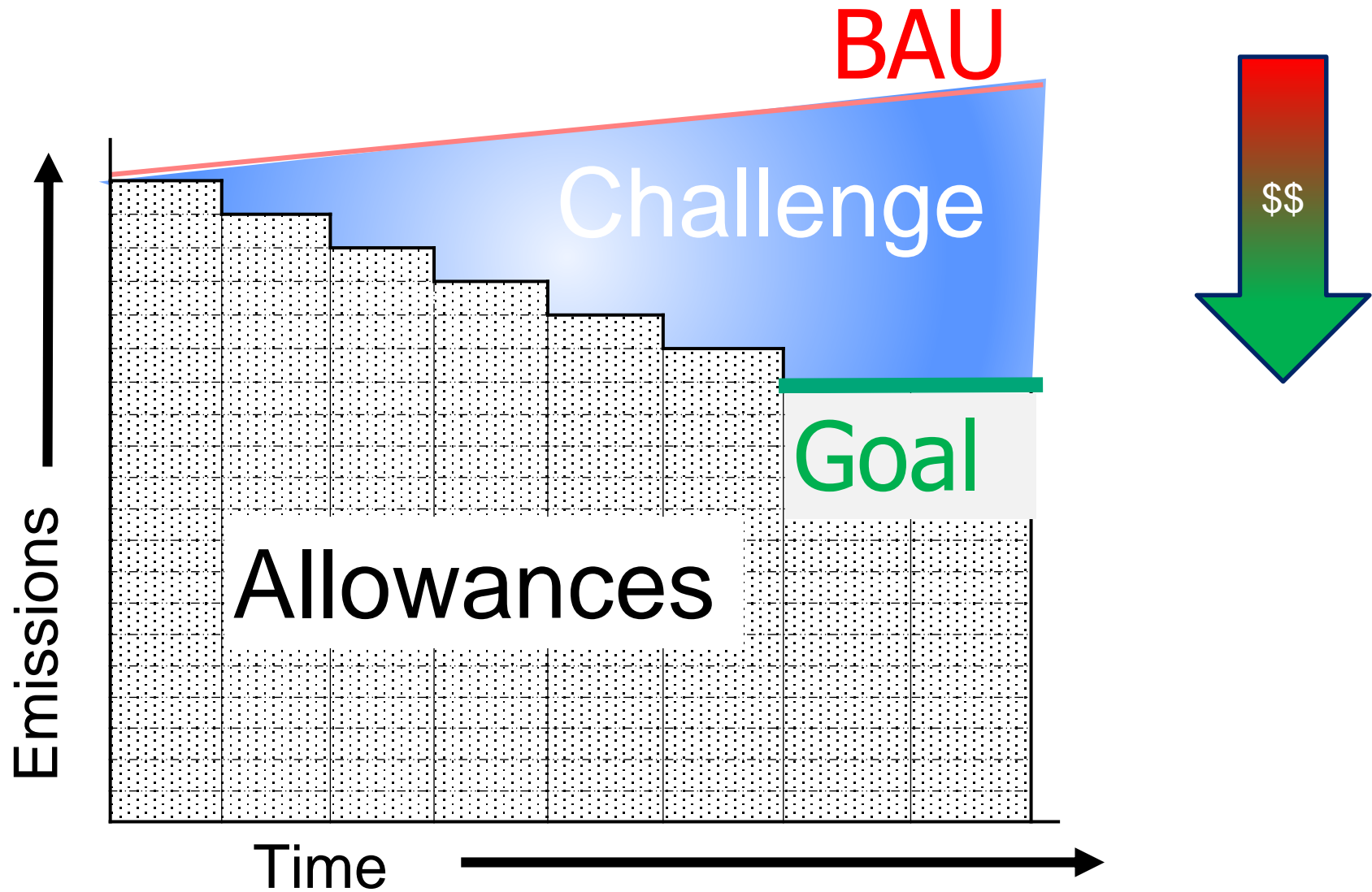
- Josh - WhatsApp – 1-415-601-4084 or WeChat - joshedf
- Tutors
- Speakup!



# ETS parameters

Total emissions limit (Cap)	355,850,000
Duration	3 years ( <i>~40 and 20 minutes</i> )
Enterprises	242 ( <i>~36 humans and 206 AI bots</i> )
Reduction target	- 9% (3%/year)
Share of free allowances	90%
Economic/emissions growth	up to 6%/year
Banking limit	100% compliance obligation
Maximum offset use	10% compliance obligation
Auction <ul style="list-style-type: none"><li>- Schedule</li><li>- Duration</li><li>- Price floor / ceiling</li><li>- Vintages</li></ul>	4 per year 45% of the year <b>\$100 / \$300</b> Current + future years
Penalty (per missing EA)	\$300 + 1 Allowance
Exchange volatility management	10%

# Objective




# ~~To Win...~~ *Do Well*

- Comply
- Manage (reduce) cost of control
- Abate early
- Participate in all markets – throughout the sim
- Try posting two-way markets
- Manage 'long' / 'short' positions
- Orders good 'til cancelled
- Wandering fingers - enter once – be patient



# Registration

1. Two-three person teams
2. One company per team
3. Close other programs
4. Sign onto WiFi
5. Open browser 
6. Go to: [carbonsim.org](http://carbonsim.org)
7. Go to: [Register](#) (*not login*)
8. Enter your own:
  - Username: *[your first name]*
  - Password: *[your choice]*
9. Enter PIN = \*\*\*\*\*
10. Pick your language

~~Login~~

Email Address

Enter email

Password

Enter password

Login

[Forgot your password?](#)

← Back

Register



Access Pin

1 \*\*\*\*

Player Name

2 Josh & Ram

Email Address

3 [Josh.EnvMkts@gmail.com](mailto:Josh.EnvMkts@gmail.com)

Password

4 \*\*\*\*\*

Company Name

BIHAR THERMOELECTRIC 1

5  I accept the [Terms & Co](#)

Register

- BIHAR THERMOELECTRIC 1
- BIHAR THERMOELECTRIC 2
- BIHAR THERMOELECTRIC 3
- BIHAR THERMOELECTRIC 4
- CASA POWER
- CICI'S THERMOELECTRIC
- CROWN PETROLEUM 1
- CROWN PETROLEUM 2
- DIMMI ELECTRIC
- DIVA THERMOELECTRIC
- GAYA POWER
- GUJARAT LIGHT AND GAS
- HAVES POWER





# LET THE GAMES BEGIN!



Each Team will manage a company participating in the emissions trading system.

# What if....?

- Policy scenarios
- Term
- Free allocations
- Forest carbon offsets
- Banking
- Auction price collars
- Penalties
- Limitations
- Linking



# Emissions Trading Simulation

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