

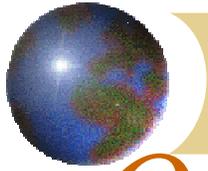


*Improving Energy Efficiency
through Pricing Policy: China's experience.*



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Outline

- ❖ Why energy pricing matters
efficiency
- ❖ How to set up energy pricing
policy
- ❖ What are barriers of energy pricing
policy
- ❖ How to overcome the barriers



Why energy pricing matters efficiency

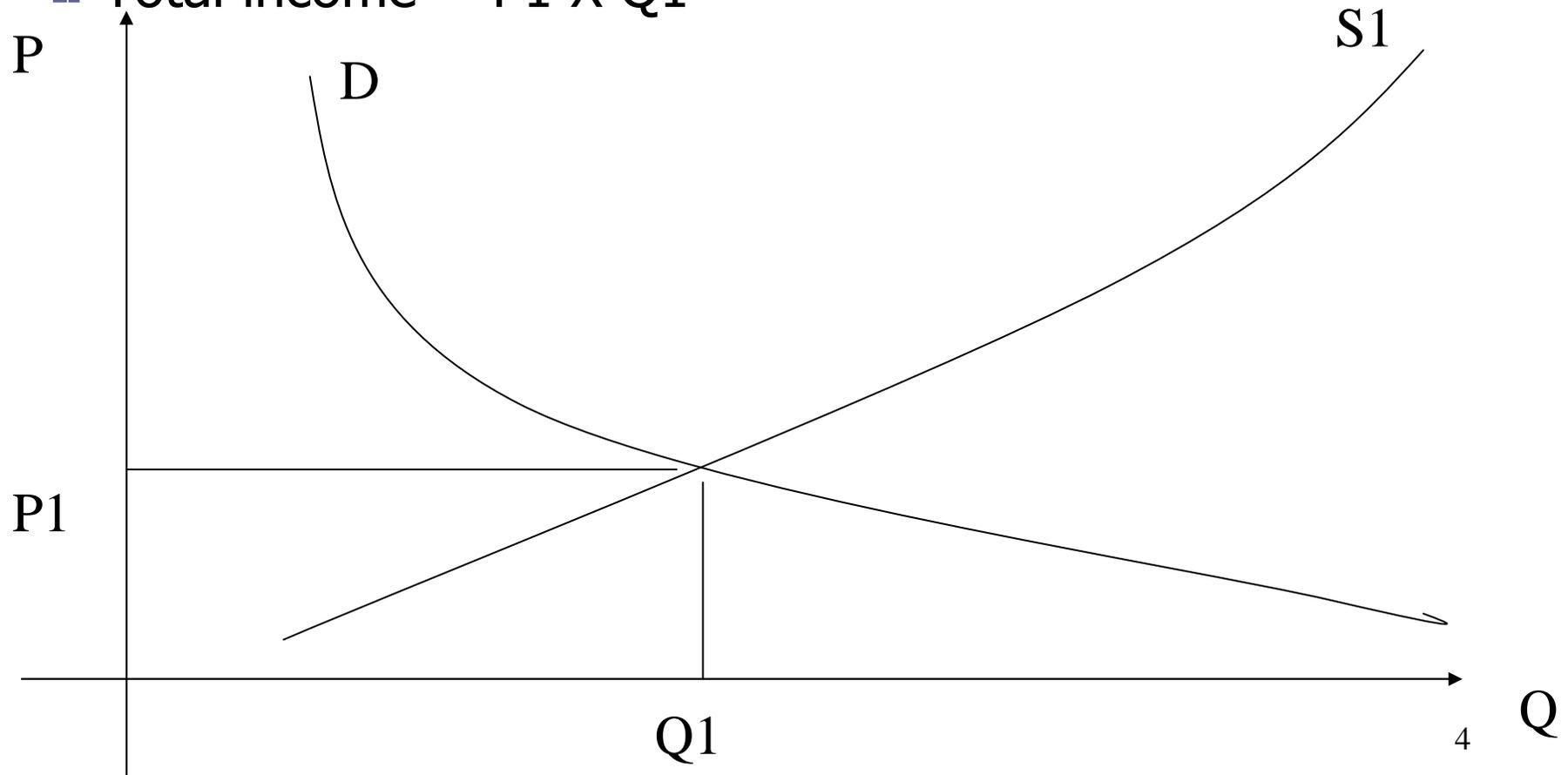
- From energy and environmental economics, if:
 - Firm, as energy supplier, is private with clear property right
 - Energy resources are scarce
 - Environmental damage costs exist
- $MOC = MPC + MDC + MEC$
 - MOC: marginal opportunity cost
 - MPC: marginal private cost
 - MDC: marginal depletion cost
 - MEC: marginal environmental cost



Why energy pricing matters efficiency

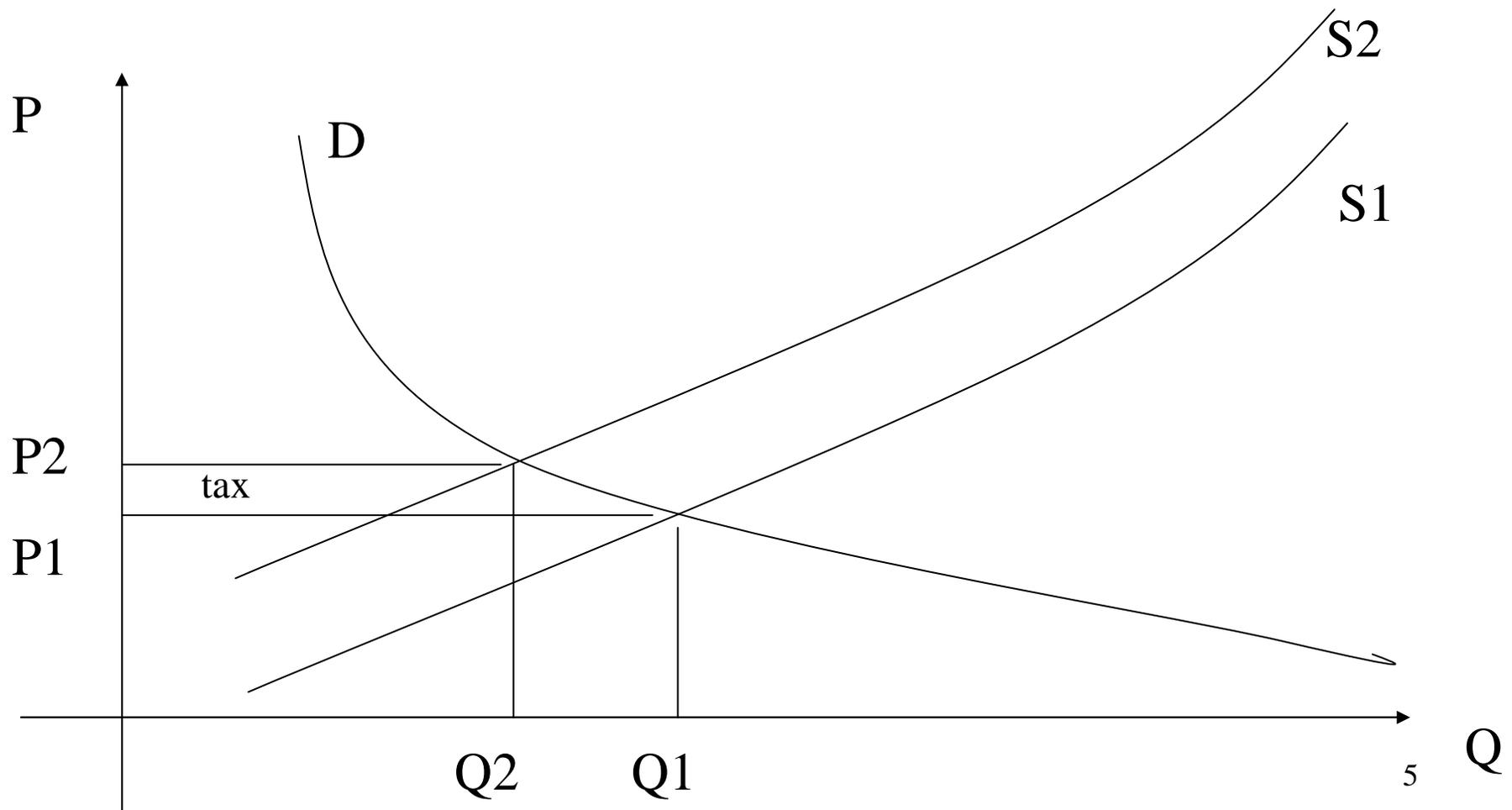
Picture 1 - Demand curve and supply curve 1:
Showing MPC scenario

Total income = $P_1 \times Q_1$



Why energy pricing matters efficiency

- Picture 2 - Demand curve and supply curve 2 (supply curve 1 + tax): Showing pricing policy scenario with MDC+MEC considerations





Why energy pricing matters efficiency

⊕ Changes of profits of energy firm after pricing policy

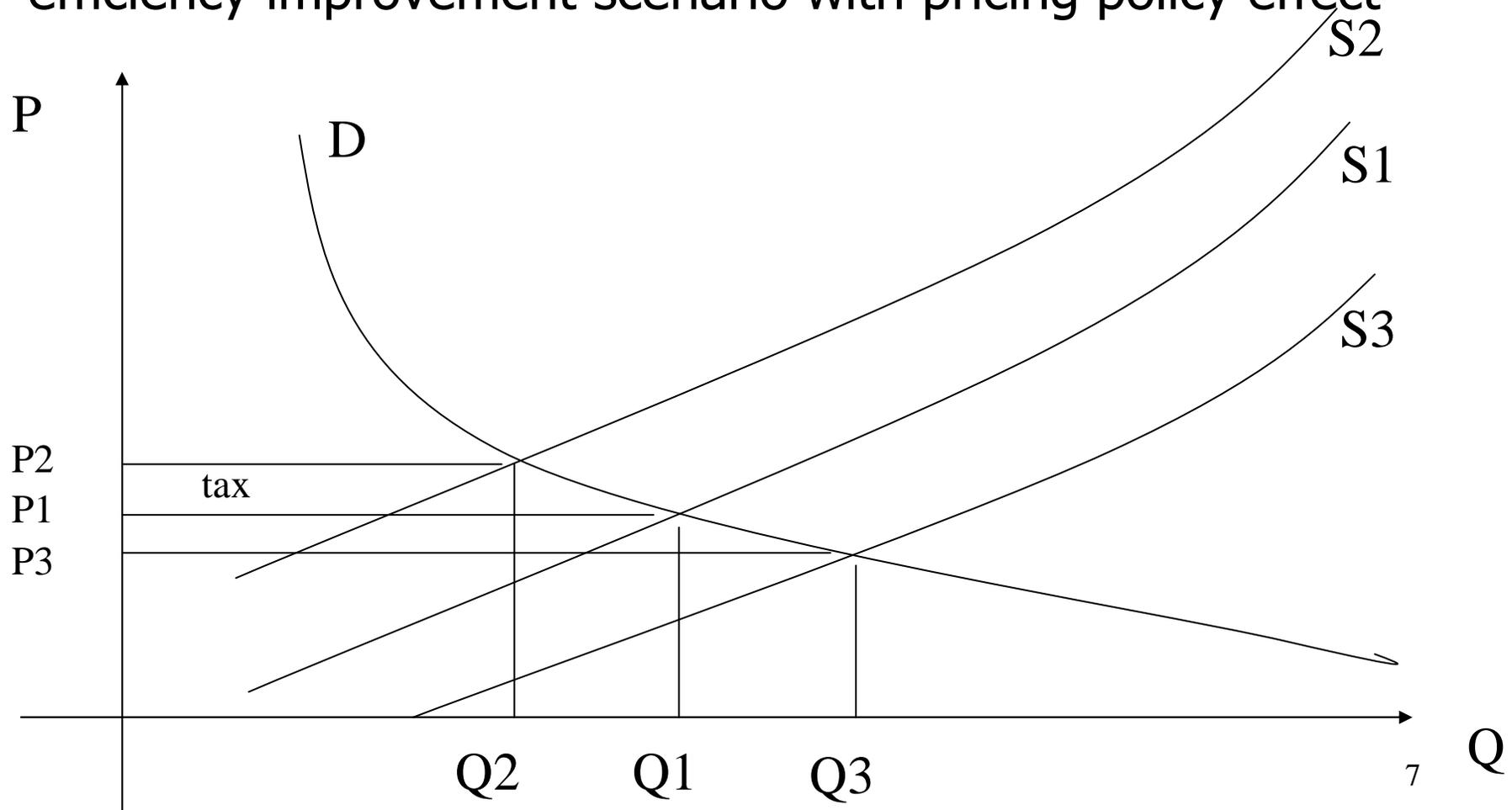
- ⊠ Original total income = $P1 \times Q1$
- ⊠ Total income with tax after pricing policy = $P2 \times Q2$
- ⊠ Total tax (volume based) = $(P2 - P1) \times Q2$
- ⊠ Therefore, net income = $P1 \times Q2$
- ⊠ Decreased profits = $P1 \times Q1 - P1 \times Q2 = P1(Q1 - Q2)$

⊕ Conclusions:

- ⊠ firm's profits are reduced after pricing policy, if firm has no positive response to pricing policy
- ⊠ if firm does have positive response to pricing policy, and then ...

Why energy pricing matters efficiency

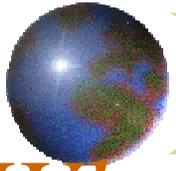
- Picture 3 - Demand curve and supply curve 3 (shifting from supply curve 2 with energy efficiency improvement, in order to ensure profitability of energy firm): showing energy efficiency improvement scenario with pricing policy effect





Why energy pricing matters efficiency

- ➊ Changes of profits of energy firm after energy efficiency improvement
 - ▣ Original total income = $P_1 \times Q_1$
 - ▣ Total income with tax after pricing policy = $P_3 \times Q_3$
 - ▣ Total tax (volume based) = $(P_2 - P_1) \times Q_3$
 - ▣ Therefore, net income = $P_3 \times Q_3 - (P_2 - P_1) \times Q_3 = (P_3 - P_2 + P_1) \times Q_3$
 - ▣ Increased profits = $(P_3 - P_2 + P_1) \times Q_3 - P_1 \times Q_1$



Why energy pricing matters efficiency

✚ Conclusions:

- ✚ The larger Q3, the more profitable firm is
- ✚ The more improvement of energy efficiency, the larger Q3
- ✚ So, firm's profits very much depends the energy efficiency improvement
- ✚ Energy efficiency improvement is the firm's positive response to energy pricing policy, in order to ensure its profitability
 - Energy efficiency improvement includes: energy efficient technology and management application; energy efficient technology and management innovation



Why energy pricing matters efficiency

✚ Conclusions:

- ✚ Of course, energy pricing doesn't matter efficiency of firms with unclear property rights, who are not sensitive to price changes and have no strong willingness to maximize their profitability
- ✚ Similarly, the energy demander's consumption efficiency by pricing policy can be analyzed as well.



How to set up energy pricing policy

✿ Taxation

- ✿ Taxes for energy resources, pollutants and GHGs
- ✿ Subsidy, as negative tax, abolishment

✿ Cap & trading

- ✿ GHGs cap and trading
- ✿ Pollutants cap and trading
- ✿ Resource using quotas and trading

✿ Command and Control Instruments

- ✿ Ceiling/flooring price setting
- ✿ Compulsory regulation with shadow price



How to set up energy pricing policy

✚ Taxation

✚ Energy tax

- Energy resource tax for energy scarcity purpose and for social equality etc, in started since China's constitution law
 - Volume based tax
 - Value based tax reform started since 2009 in Xinjiang
- Shifting road fee to fuel tax at 0.8 Yuan/L, since January 1, 2009
 - Fuel efficiency at national average improved from 9L per hundred kilometre drive to 7.5 L, due to
 - 30% economy car sale increasing comparing previous years
 - Comparatively more people shifting to public transportation
 - National IV emission standards (Euro IV standards equivalent) being applied nation-wide and National V emission standards (Euro V standards equivalent) being applied in Beijing Municipality



How to set up energy pricing policy

✚ Taxation

✚ Carbon tax

- Carbon tax being proposed and to be approved by National People's Congress in the future
- CGE model simulations of carbon tax levels: 10 Yuan/ton, 30 Yuan/ton, 100 Yuan/ton

✚ Environmental tax/levy

- For SO₂, 0.6 Yuan/kg
- For NO_x, 0.6 Yuan/kg

✚ Subsidy abolishment

- Electricity subsidy abolishment during 1980-1990's



How to set up energy pricing policy

✚ Cap & trading

- ✚ Cap for GHGs and potentially trading in the future
 - 3 carbon exchange offices in Beijing, Tianjin and Shanghai as pilot and mock trading for post-Kyoto Protocol
- ✚ Cap for SO₂/NO_x and pilot trading
 - Pilot in 2 cities and 6 provinces
- ✚ Cap for coal consumption in key areas and potentially trading during 2011-2015
 - Yangzi River Delta
 - Pearl River Delta
 - Bohai Sea Area

✚ C&C instruments

- ✚ Energy intensity 20% reduction in the 11th 12th five year plan (2006-2010)
- ✚ Energy intensity 18% and carbon intensity 17% reduction targets in 12th five year plan (during 2011-2015)
- ✚ Fed-in-Tariff for wind power and solar power as flooring prices of State Grid (of electricity)



What are barriers of energy pricing policy

● Macro-Economic

- High inflation concern
- Weakened competitiveness concern by exporting sectors

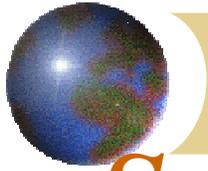
● Social and political

- Poor people affordability concern
- Social pressure concern
- Political stability concern



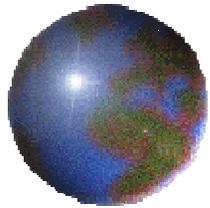
How to overcome the barriers

- The key question for decision makers is how to balance energy efficiency, environmental security and social security
 - Differentiated energy prices policies
 - High electricity prices for high energy intensive industries and low electricity prices for householders
 - Block-price system: low price for basic electricity consumption and higher price for “luxury” electricity consumption
 - Tax on suppliers of energy + subsidy for consumers from tax revenue
 - Rising up natural gases price with tax + providing subsidies for householders



Summary

- ✚ Higher energy pricing policy could improve energy efficiency by higher efficiency technology applications and technology innovations
- ✚ Energy pricing policy can be done through taxation, Cap&Trading and even C&C instruments
- ✚ Barriers of energy pricing policy are economic, social and political concerns by decision-makers
- ✚ It's possible to balance energy efficiency, environmental security and social security by policy innovations!



Thank you!