



EE475: Natural Resource Economics

National security and climate change dimension of energy, and the recyclable resource

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The energy issues

- Before Songkran Holiday
 - Effects of Price ceiling on energy market
 - The Cartel problem
- Today
 - National security and climate dimension of energy



Outline

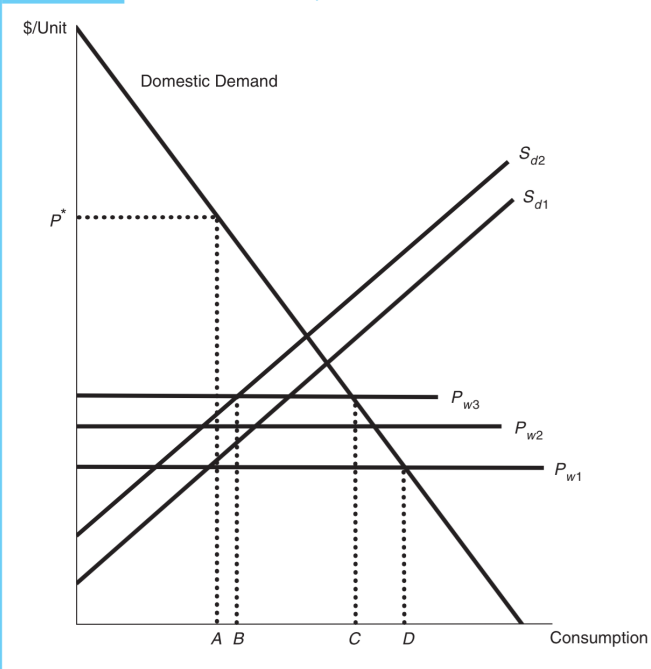
- National security and climate dimension of energy
- Recyclable Resources
 - Market for Recyclable resource
 - Recycling and Ore depletion
 - Disposal cost and efficiency



The National Security and Climate Dimensions of energy

- Oil is a strategic resource.
- Importing oil can increase vulnerability to the country's economy and national security.
- National Security is a classic public goods. Market usually fails to provide adequate public goods.
- Leaving the determination of the appropriate balance between imports and domestic production to market —> Excessive dependence on imports.
- In addition, energy consumption contributes to climate change problem.

FIGURE 7.4 The National Security Problem



Tietenberg
& Lewis
2012, p.153

The National Security Dimension

- What would happen during an embargo (an official ban on trade or other commercial activity with a particular country)?
- If self-sufficient option is possible for the importing country, should it stop importing and be self-sufficient?
- Why would we want any imports at all when national security is at stake?



Recyclable Resource

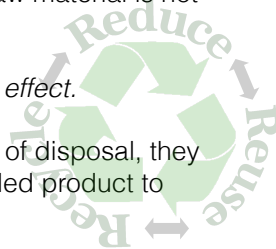
Recyclable Resources

- Unlike energy, other minerals can be recycled, under proper conditions, because even after used they maintain some basic physical and chemical properties
- Two main pressures for recycling
 - Extraction cost would eventually increase even with technological progress as new sources become increasingly difficult to extract.
 - Disposing cost would increase as population density increased. Higher level of wealth also supported higher level of waste.



Recyclable Resources

- In the market for product from recycled raw material, consumers can play roles in both demand and supply.
- On demand side, the consumers will switch to product from recycled raw material if
 - the one from virgin material is more expensive.
 - the quality of the product from recycled raw material is not adversely affected.
 - This is called the *composition of demand effect*.
- On supply side, if the consumers bear the cost of disposal, they would have incentive to return their used recycled product to collection centers.



Recyclable Resources

- Purity of the recycled products can strengthen the demands.
- Waste that contains hazardous materials, for example, e-waste, raises additional complexities. This needs additional regulations and proper enforcement mechanism to make sure that the hazardous waste is taken care of properly.



Costs of recycled product

- In most cases recycling is not cheap. It involves several types of costs.
 - What types of cost do you think are involved in the recycling process?
- If the recycling market operates smoothly, scrap from used products can become a cost-competitive input.



Recycling and Ore Depletion

- Comparing two types of materials with identical extraction cost but one is recyclable and the other is not, **how do you think the recycling would affect the timing of switching point to substitutes?**
- How much more of this resource was made available by recycling?
 - $A / (1-a)$; a is recovery rate
 - What can we imply from the above formula?



Disposal cost and efficiency

- Two kinds of scrap
 - New Scrap = the residual materials generated during production
 - Old Scrap = materials recovered from products used by consumers
- In term of costs in recycling process, what do you think is the different between them?



Disposal cost and efficiency

- Market for old scrap works inefficiently because the product users do not bear the full marginal social costs of disposing of their product. —> The market biased away from recycling old scrap.
- Cost of delivering the scrap to a recycling center vs Disposal cost

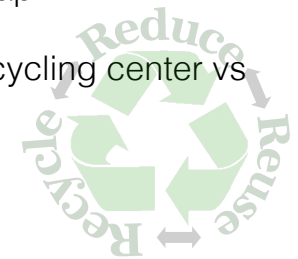


FIGURE 8.3 The Efficient Level of Recycling

