

系 所：資源工程學系

考試科目：資源管理問題解析

考試日期：0227，節次：2

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以下四題（每題 25 分）請詳讀題目後說明：(1)題目之主要重點及 (2)該題在資源管理之意涵。

（資料來源：Tom Tietenberg and Lynne Lewis(2012), **Environmental & Natural Resource Economics, 9th Edition, Pearson Education Inc.**）

一、 According to the United Nations, about 40 percent of the world's population lives in areas with moderate-to-high water stress. ("Moderate stress" is defined in the U.N. Assessment of Freshwater Resources as "human consumption of more than 20 percent of all accessible renewable freshwater resources," whereas "severe stress" denotes consumption greater than 40 percent.) By 2025 it is estimated that about two-thirds of the world's population—about 5.5 billion people—will live in areas facing either moderate or severe water stress.

This stress is not uniformly distributed around the globe. For example, in the United States, China, and India groundwater is being consumed faster than it is being replenished and aquifer levels are steadily falling. Some rivers, such as the Colorado in the western United States and the Yellow in China, often run dry before they reach the sea.

According to U.N. data, Africa and Asia suffer the most from the lack of water supply and sanitation in urban areas. Up to 50 percent of Africa's urban residents and 75 percent of Asians lack adequate access to a water supply.

The availability of potable water is further limited by human activities that contaminate the finite supplies. According to the United Nations, 90 percent of sewage and 70 percent of industrial wastes in developing countries are discharged without treatment.

Some arid areas have compensated for their lack of water by importing it via aqueducts from more richly endowed regions or by building large reservoirs. Regional and international political conflicts may result if the water transfer or the relocation of people living in the area to be flooded by the reservoir is resisted. Additionally, aqueducts and dams may be geologically vulnerable. For example, in California many of the aqueducts cross or lie on known earthquake-prone fault lines (Reisner, 2003). The reservoir behind Three Gorges Dam in China is so vast that the pressure and weight is causing tremors and landslides.

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- 二、 On the surface the answer seems like a no-brainer, since wind power is a renewable energy source that emits no greenhouse gases, unlike all the fossil fuels it would be likely to replace. Yet some highly visible, committed environmentalists including Robert Kennedy Jr. have strongly opposed wind projects. Why has this become such a public contentious issue?

Opposition to wind power within the environmental community arises for a variety of reasons. Some point out that the turbines can be noisy for those who live, camp, or hike nearby. Others note that these very large turbines can be quite destructive to bats and birds, particularly if they are constructed in migratory pathways. And a number of opponents object to the way the view would be altered by a large collection of turbines on otherwise pristine mountaintops or off the coast.

Both the benefits from wind power (reduced impact on the climate) and the costs (effects on aesthetics, birds and noise) are typically externalities. This implies that the developers and consumers of wind power will neither reap all of the environmental benefits from reduced impact on the climate, nor will they typically bear the environmental costs. Making matters even more difficult some of the environmental costs will be concentrated on a relatively few people (those living nearby, for example), while the benefits will be conferred on all global inhabitants, many of whom will bear absolutely no costs whatsoever. The concentrated costs may be an effective motivator to attend the hearings, which are likely to be held near the proposed site, but the diffuse benefits will likely not be.

Since the presence of externalities typically undermines the ability of a market to produce an efficient outcome, it is not surprising that the permitting process for new wind power facilities is highly regulated. Regulatory processes generally encourage public participation by holding hearings. With environmental externalities lying on both sides of the equation and with many of the environmental costs concentrated on a relatively small number of people, it is neither surprising that the hearings have become so contentious, nor that the opposition to wind power is so well represented.

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- 三. In proposing more stringent ambient standards for ozone and particulates, the USEPA had concluded that 125 million Americans, including 35 million children, were not adequately protected by the existing standards. The new standards were estimated to prevent one million serious respiratory illnesses each year, and 15,000 premature deaths.

The proposed revisions were controversial because the cost of compliance would be very high. No health threshold existed at the chosen level (some health effects would be noticed at even more stringent levels than those proposed) and the EPA was, by law, prohibited from using a benefit/cost justification. In the face of legal challenge, the EPA found it very difficult to defend the superiority of the chosen standards from slightly more stringent or slightly less stringent standards.

In a decision issued May 14, 1999, the U.S. Court of Appeals for the District of Columbia Circuit overturned the proposed revisions. In a 2-1 ruling the three-judge panel rejected the EPA's approach to setting the level of those standards:

the construction of the Clean Air Act on which EPA relied in promulgating the NAAQS at issue here effects an unconstitutional delegation of legislative power.... Although the factors EPA uses in determining the degree of public health concern associated with different levels of ozone and PM are reasonable, EPA appears to have articulated no "intelligible principle" to channel its application of these factors.... EPA's formulation of its policy judgement leaves it free to pick any point between zero and a hair below the concentrations yielding London's Killer Fog.

Although the threat to the EPA's authority was ultimately overturned by the U.S. Supreme Court, the dilemma posed by the absence of a compelling health threshold remains.

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- ④. Recognizing the dangers from improperly disposed electronic equipment (e-waste), some states have enlisted economic incentives to promote recycling. The EPA reports that in 2005 2 million tons of TVs, computers, computer accessories, and cell phones were discarded; 80 to 85 percent (1.5 to 1.9 million tons) was discarded in landfills. Although this represented less than 2 percent of the municipal solid waste stream, electronics waste is a fast growing segment of the waste stream, bringing with it rising concerns about the environmental and health effects of some of this waste. Lead, mercury, cadmium, and brominated flame retardants are all widely used in electronics. All of these substances have been linked to health risks, especially for children, and are considered hazardous waste.

In 2004 California passed a bill that makes it unlawful for retailers to sell mobile phones without the establishment of a collection, reuse, and recycling system for proper disposal of used cell phones. This bill places the responsibility for recycling squarely upon the industry, but leaves the implementation details up to them. While this approach allows the industry to minimize recycling costs, it remains to be seen whether the resulting policy promotes reuse of the materials in a manner that is safe for human health and the environment.

Internationally, the Basel Convention regulates the movement of electronic waste across international boundaries (UNEP 1989) although not all countries have ratified this treaty. One component of the convention would prohibit the export of e-waste from developed to industrializing countries since, in addition to valuable materials, the waste contains hazardous materials such as lead and mercury.

In their analysis of trends of e-waste Widner et al. (2005) find that for countries such as China and India, e-waste is rapidly growing from both domestic sources and illegal imports. These countries are just beginning to impose laws to fight e-waste imports, but enforcement is lacking and the valuable materials create a business opportunity. Widner et al. estimate that 50 to 80 percent of collected domestic e-waste from nonratifying Basel Convention countries, such as the United States, is shipped to China and other Asian countries.