

An Economic, Ecological and Legal Analysis of Emissions Trading.

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I. Introduction

This paper examines the suitability of emissions trading as an economic instrument of environmental protection. An analysis of emissions trading shows that it does offer some economic and ecological advantages over other instruments. With appropriate trading scheme design and implementation from the responsible authority, the system can also function as a method of environmental protection and offer a means for reducing emissions in the long-term.

However, emissions trading alone is not a comprehensive method of emissions reduction. It functions within the scope of narrowly defined economic models - in which environmental degradation is treated as nothing more than an external effect of the normal operation of the market economy.

In addition, emissions trading is dependant upon, and subservient to, various characteristics of free market capitalism, which are questionable if

the promotion of sustainability and effective environmental protection are considered policy areas of primary importance.

Emissions trading currently exists in two forms: “cap and trade” and “baseline and credit”. The focus of this paper is the “cap and trade” method.¹

II. The Market Economy

The role of the market in the modern economy is to serve society with the organisation of economic activity.² The free market is powerful due to its ability to decentralise decision making and trade. The role of a central planning authority decreases, with resources being automatically allotted to those who can pay the highest price.³

But the market economy, which is primarily activated through the aspiration to maximise private benefit, does not always cater for a socially optimal result.⁴ If public resources are exploited by a producer, the market technically “fails”, as the actual social and environmental costs of the production process are not evident in the price of the item on the market. As a result, the market alone is unable to recognise the need to protect a public natural resource by tempering the level of demand with an increase in price. Hence, increased demand continues to raise emissions and are not internally regulated by the market.

At times, the activities of a producer or consumer have a negative impact on the environment, without market adjustment to charge for this impact -

¹ In this form of trading, a grand total of emission permits is set, which may not be exceeded by the participating industries.

² Hanley, *Environmental Economics in Theory and Practice* 2nd Ed., p42

³ Hanley, *Environmental Economics in Theory and Practice* 2nd Ed., p42

⁴ Zimmer, C_O₂-Emissionsrechthandel in der EU, S. 69

the result is known as an external effect or externality.⁵ This phenomenon takes place outside of the sphere of influence of the market economy.

In the area of the environment, external effects are wide ranging – for example: destruction of ecosystems, acid rain or global effects such as climate change.

To appreciate how emissions trading is intended to operate as a method of environmental protection, an understanding of the economic theory upon which it is based is first required.

1. External Effects

According to economic theory, the market is incomplete when it fails to protect the environment.⁶ Phenomena, such as environmental degradation, take place external to the function of the market. The market, which is based on the consideration of private costs and benefits, lacks a mechanism to deal with costs which take place externally and come at a cost to the general public.⁷ The role of the government is then to implement a responsible policy to incorporate these external effects in the decision making process and in regulating the market activities of the private parties involved.

The traditional instruments which a government has at its disposal are coercive command and control regulations, such as ownership of environmental resources, with corresponding fines for violations. However, due to arguments of efficiency and incentives, mainstream economic thought is not in favour of restricting the course of the free market.

5 Wallert, *The Political Economy of Environmental Taxes*, Massachusetts, p9

6 Hussen, *Principles of Environmental Economics: Economics, Ecology and Public Policy*, p55

7 Hussen, *Principles of Environmental Economics: Economics, Ecology and Public Policy*, p55

2. Coase Theorem

According to the so-called Coase Theorem, which dates to 1960, and is regarded as a significant step in free market economics, external effects can be effectively removed via an extension of private ownership, without significant state intervention in the operation of the free market.⁸ After additional property rights have been completely assigned, external effects can be internalised through the private negotiations of the parties involved.⁹ According to this model, a factory is not able to pollute a river, as the river belongs to someone, who can protect it through property rights.¹⁰

The existence of transferable rights would enable both parties to negotiate. As a result, unsustainable resource exploitation would be suppressed in favour of the socially optimal result.¹¹ Consequently, the role of the state would simply be to assign property rights where none were currently in existence.

However, this system has flaws. In the absence of the environmental resource being owned by a party willing to protect it, it would remain susceptible to degradation. Furthermore, property rights cannot always be established. In the case of environmental resources, the cause and effect interactions of an ecosystem are neither direct nor obvious. Actions, which take place in one area, may reverberate through the ecosystem and have an unexpected effect. In this way, external effects may arise at a different point of the ecosystem to where the cause is to be found. Finally, the promotion of an economic model, which functions in accordance with private ownership and the resulting exclusion of the use of others, is not

⁸ See Coase, *Journal of Law and Economics*, Vol III, October 1960

⁹ Coase, *Journal of Law and Economics*, Vol III, October 1960, p5

¹⁰ Wallart, *The Political Economy of Environmental Taxes*, p12

¹¹ Wallart, *The Political Economy of Environmental Taxes*, p16

always in the public interest, nor even that of the individual. As a result, an incapacity and reluctance emerges against creating a completed market.

III. Emission trading

1. Fundamental Characteristics

Emissions trading, and emissions permits, were put forward by Crocker (1966) and Dales (1968) as an adaptation of the Coase Theorem and its use of property rights to reduce emissions.¹² Emissions trading is an economic instrument, which can be used to restrict emissions to a pre-determined level in a certain area or jurisdiction. Emissions permits – or rights to emit – according to the new restricted target level for the entire area are distributed or sold to producers of emissions within that area. Should a company reduce its emissions to the extent that it has unused permits, these can be sold to others on the emissions market. Those firms, which fail to achieve a reduction in accordance with their level or permits are required to purchase more. Such a purchase is particularly attractive to a company for whom the required emissions reduction would be more expensive than the purchase of additional emissions credit from the market. New or growing businesses will be buyers, shrinking businesses, or those with improved emission standards will be vendors, with the combined action of these groups creating a market for emissions trading.¹³ Theoretically, emissions can in this way be reduced in the most cost effective manner with the expense to industry being restricted.

2. Design

The implementation of an emissions trading system has many variables. This flexibility can serve as a strength or weakness, depending on the availability of information and the capacity of the authority to act

¹² *Wallart*, The Political Economy of Environmental Taxes, p19; see also *Dales*, Pollution, Property and Prices, p111

¹³ *Dales*, Pollution Property and Prices, p94

accordingly.¹⁴ Emissions trading can only function effectively, if the authority has sufficient information to design the market. The role of the authority is primarily to determine how many emissions permits to make available on the market, and how to distribute these initially (i.e. via free allocations or sales).¹⁵ This task is of critical importance and may be decisive of the success of the emissions trading system.

a. Total Permits

As an economic instrument of environmental protection, the success of emissions trading is highly dependant upon the total of distributed permits.¹⁶ The total should be determined after the consideration of a cost-benefit analysis to society as a whole.¹⁷ If the authority has good knowledge of the costs and benefits of pollution control, theoretically, the quantity of emissions can be reduced to a level that is considered socially optimal.¹⁸ However, if the costs of pollution control are uncertain, the efficacy of the emissions trading system will be brought into question. In general, predicted costs that are too high result in pollution control that is too intensive; too low, and they lead to insufficient pollution control.¹⁹

In order to overcome the risk to the environment, Dales (1968), in the earliest literature on emissions trading, suggested that the authority should be an active participant on the market. Should no bid be made within 90% of the purchase price, the authority would buy the permits.²⁰ In this way, the authority would prevent the price from sinking rapidly and stabilise the market, in the event that, for example, many large industries were to sell their permits concurrently.²¹ Nevertheless, state intervention, even within

14 Hanley, *Environmental Economics in Theory and Practice* 2nd Ed., p113

15 Hanley, *Environmental Economics in Theory and Practice* 2nd Ed., p113

16 Hussen, *Principles of Environmental Economics: Economics, Ecology and Public Policy*, p113

17 Hussen, *Principles of Environmental Economics: Economics, Ecology and Public Policy*, p113

18 Hanley, *Environmental Economics in Theory and Practice* 2nd Ed., p113

19 Hanley, *Environmental Economics in Theory and Practice* 2nd Ed., p115

20 Dales, *Pollution Property and Prices*, p94

21 Dales, *Pollution Property and Prices*, p94

emissions trading, lies contrary to free market theory and this proposal has only sparingly been implemented in practice.

A market of exchangeable permits guarantees their eventual cost effective distribution, but only after the initial distribution by the authority.²² The question of whether the distribution leads to optimised use of environmental resources is dependant on how the authority determines the total amount of permits, and therefore, how it estimates the environmental cost.²³ This task - gathering reliable statistics on environmental costs - is challenging, and raises a series of economic, ecological and ethical questions, which will be discussed further under Environmental Evaluation.²⁴

b. Distribution of Permits

After the quantity of permits is determined, the authority requires a mechanism to distribute them to polluters. This takes place either by way of auction or a free distribution. If permits are market ready without incurring further costs, the distribution mechanism normally has no further effect. A competitive market will ultimately distribute permits.²⁵ In this situation, the costs of pollution control are independent of the initial distribution of permits.²⁶ Nevertheless, the distribution has important economic consequences, which are worth considering further.

aa. Auction

An auction, as well as an environmental tax, offers an incentive to polluters to avoid emissions. The permits are sold to highest bidding firms. The cost of reduction is then partly carried by consumers, making it financially unattractive to manufacture emission intensive products. Hence, the cost of environmental damage is imposed on the polluter and,

²² Stavins, *Journal of Environmental Economics and Management*, September 1995, 29, p140

²³ Hussen, *Principles of Environmental Economics: Economics, Ecology and Public Policy*, p116

²⁴ Hussen, *Principles of Environmental Economics: Economics, Ecology and Public Policy*, p116

²⁵ Stavins, *Journal of Environmental Economics and Management*, September 1995, 29, p140

²⁶ *Montgomery*, *Journal of Economic Theory*, 1972, vol. 5, issue 3, S. 408

in this way, emissions trading is in agreement with the polluter pays principle.²⁷

A further advantage is the generation of state revenue, which can be used for other benefit. Hence, taxation can be directed increasingly towards negative phenomena, such as environmental degradation, and less, at positive phenomena such as income.

bb. Free Distribution

If the permits are distributed without charge, the authority must determine how this distribution is to take place, who has claim to the permits, and what the level of their claim is. Two options are benchmarking and grandfathering.

(1) Benchmarking

With benchmarking, emissions from production are measured in comparison with a specific standard. For this reason, efficiency is paramount. Businesses, which produce similar goods in equal quantities, would receive the same amount of emissions permits.²⁸ As a result, companies which produce more efficiently would receive surplus permits that can be sold on.²⁹ As a result they receive an economic advantage.

(2) Grandfathering

Grandfathering involves permits being distributed according to the historical levels of emissions, independent of performance and efficiency. This method is highly supported by industry, as it enables the compliance costs of the environmental protection measures to be reduced. As the polluter does not pay the state for the right to emit, grandfathering is generally more accepted by industry than the alternatives.³⁰ Grandfathering, however, violates the polluter pays principle (see later).

²⁷ Costanza, Einführung in die ökologische Ökonomik, p258

²⁸ Lucht, Emissionshandel, Berlin 2005, S. 21

²⁹ Lucht, Emissionshandel, Berlin 2005, S. 21

³⁰ Wallart The Political Economy of Environmental Taxes, Massachusetts, p25

Under a grandfathering arrangement, companies may be able to increase their emissions shortly before the distribution of permits, in order to demand a larger amount of emissions rights. Grandfathering is also problematic in regards to successive trading periods. The benefit of reducing emissions for a firm would be reduced, to the extent that it disallows itself to the permits corresponding to that reduction in the following period.

Due to pressure from industry, grandfathering has been almost exclusively implemented in preference over other methods.

The choice between sale and free distribution of permits is also important due to the impact of wealth distribution in society. Free distribution has the tendency to increase the socio-economic gap between large and small earners. This results from the fact that the value of equity capital, which is typically owned by those on higher incomes, is raised by a free distribution.³¹ On the other hand, if permits are auctioned, what was an asset for the company becomes income for the state.³² The government may then reduce company taxes, which would have a similar effect to grandfathering, i.e. to the benefit of the emitting firms. However the government may also invest in social and environmental schemes, or reduce income taxes. Such measures affect a wider ranging benefit for the society.

c. Ecological Adaptation

So-called “hot-spots” are areas where polluters are in high concentration. Emissions trading can be a cause of hot-spots, if they allow for a larger concentration of emissions, than what would be permitted under command and control regulations.³³

31 *Dinan*, National Tax Journal LV 2002, p200

32 *Goulder*, Environmental Economics and Policy, volume 2, issue 2, summer 2008, p164

33 *Tietenberg*, Environmental and Resource Economics, vol. 5, 1995, p99

If a company sells emissions permits, the sale must be accompanied by a corresponding reduction of emissions. As a result, total emissions are not increased. If, however, the purchasing factory is located at a site which is ecologically more susceptible to pollution (e.g. at a river) the environmental damage will increase, although the total level of emissions remains stable.³⁴ A variety of measures has been suggested in emissions trading literature to overcome this problem.

aa. Emissions Permits versus Pollution Permits

Montgomery (1972) described two possible varieties of permits: a “pollution licence” and an “emissions license”.³⁵ An emissions license gives a firm the direct right to emit up to a pre-determined level. A pollution licence, on the other hand, gives a firm the right to emit, but only to the extent that the pre-determined level of pollution for the area – whatever that area is deemed to be – is not exceeded.³⁶ As emissions may have an impact on multiple areas, Montgomery suggested that a firm possess permits which surround all relevant “pollution control points”. In this way, environmental objectives can be reached in multiple areas, while retaining the advantages of the market system.³⁷

bb. Ambient Permits System

This system involves the extension of the emissions market to include the location of environmental damage via so-called “environmental receptors”. Permits are denoted according to the environmental receptor, which is assigned a level of emissions.³⁸ A separate market exists for each receptor, and companies are required to trade in all markets in which their emissions have an impact.³⁹ This leads to a very complicated market with very high transaction costs.⁴⁰ Furthermore, total emissions could actually increase, if at one receptor, the emissions from the purchaser have a

³⁴ *Hanley*, Environmental Economics in Theory and Practice 2nd Ed., p156

³⁵ *Montgomery*, Journal of Economic Theory, 1972, vol. 5, issue 3, p396

³⁶ *Montgomery*, Journal of Economic Theory, 1972, vol. 5, issue 3, p396

³⁷ *Montgomery*, Journal of Economic Theory, 1972, vol. 5, issue 3, p396

³⁸ *Hanley*, Environmental Economics in Theory and Practice 2nd Ed., p155

³⁹ *Hanley*, Environmental Economics in Theory and Practice 2nd Ed., p155

larger impact than those of the vendor. As a result, the purchaser may increase its emissions further than the reduction made by the vendor, placing the eco-system at risk of further or unknown problems.⁴¹

cc. Pollution Offset Systems

The pollution offset systems are similar to the ambient permit System, but return to the premise that all permits correspond to the same amount of emissions, and include rules to enforce environment quality objectives.⁴² If a “non-degradation clause” is included, an exchange of permits would be permitted, provided neither the pre-existing pollution level of one area, nor the general target – depending which is more stringent – is violated.⁴³ This has the ecological advantage of ensuring the reduction, without affecting degradation in the areas that are already less polluted than the standard.⁴⁴ “Modified-offsets” are less strict, as only the general target level applies, enabling a larger amount of trade between regions.⁴⁵

Theoretically, an emissions trading system can be tailored to the individual economic and ecological circumstances of the target area. Emissions trading offers industries a wide range of compliance and reduction strategies. Nevertheless, the need to implement such offset-systems demonstrates that the success of emissions trading as an economic instrument of environmental protection is still dependant on restrictions and regulation of the “free market”.

Emissions trading could be environmentally damaging, if it is implemented without due consideration of the ecological susceptibility of an area, and without the necessary corresponding adaptations.

40 *Hanley*, Environmental Economics in Theory and Practice 2nd Ed., p155

41 *Hanley*, Environmental Economics in Theory and Practice 2nd Ed., p156

42 *Hanley*, Environmental Economics in Theory and Practice 2nd Ed., p156

43 *McGartland*, Journal of Environmental Economics and Management 1985, 12, p219

44 *McGartland*, Journal of Environmental Economics and Management 1985, 12, p222

45 *McGartland*, Journal of Environmental Economics and Management 1985, 12, p219

IV. Economic Reasons for Emissions Trading

1. Economic Efficiency

Emissions trading is effective in raising efficiency. As indicated above, the cost burden of emissions trading is carried by the consumer, as well by the industry. The key to the success of market instruments is to exploit varying emissions reduction compliance costs of polluters.⁴⁶ Furthermore, an important characteristic of permit trading is the transfer from the authority to the industry for design and location of measures to control pollution. This is also supportive of efficiency, as a company should know the most cost-effective way to reduce its emissions.

Emissions trading offers the possibility for a company to seek out the most efficient solution across national or even international level. Depending on the precise nature of the scheme, a company may be able to tally emissions from a range sources into a grand total, instead of being forced to comply with individual targets. This is the so-called “bubble solution”.

a. Banking

Credit-based trade systems allow surplus emissions permits that are not presently required for emissions, to be transferred to a future emissions period.⁴⁷ This credit can then be used by the company – or a third party who purchases the credit – for emissions in a later period.⁴⁸

b. Borrowing

Emissions borrowing involves future emissions rights being brought forward or “borrowed” to the current trading period.⁴⁹ It is argued that this would improve technological development, as well as economic efficiency.⁵⁰

⁴⁶ Endres, Springer Science, 2005, p33

⁴⁷ Endres, Springer Science, 2005, p29

⁴⁸ Harrison, International Yearbook of Environmental and Resource Economics 2002/2003, p314

⁴⁹ See, for example, Endres, Springer Science, 2005

⁵⁰ Endres, Springer Science, 2005, p30

The problem with this idea is that such a concession may undermine the main purpose of emissions trading, especially in regards to greenhouse gas emissions. Excessive past and current emissions are, in general, the cause for an emissions trading system to be implemented. In some respects, problems have emerged for precisely this reason – i.e. that the rights of future generations to emit have already been taken up by current and past emitters. This contradiction shows the “fundamental irrationality of a futures market” in emissions trade.⁵¹ If such an arrangement were ruled with strict periods, it may assist efficiency and concurrently reduce emissions. However, due to the problems mentioned, it remains a strategy that must be judged on a case by case basis.

2. Technological Development and Incentives

As a method of incentive for new technologies, emissions trading as well as an emissions tax, which will be discussed in greater depth later, are very effective instruments. The less a company emits, the more income it can generate through the sale of surplus permits – this stimulates the development of emission reductions technology.⁵² In a well functioning emissions market where there is a market price for emissions, firms are enticed to reduce their emissions with economical and innovative methods, and through these methods, ultimately, generate income.⁵³ In this way, there are profitable opportunities in the development of environmental protection technology.⁵⁴ Emissions trading effectively engages companies in a race to reduce pollution or develop more effective technology, as ultimately, they can benefit from such measures.

In summary, market instruments are very advantageous for technological development in comparison to the alternative, command and control regulations. Command and control does not offer incentive to companies

51 Tokar, Dollars and Sense, March/April 1996

52 Costanza, Einführung in die ökologische Ökonomik, Stuttgart 2001, p258

53 Harrison, International Yearbook of Environmental and Resource Economics 2002/2003, p313

to reduce their emissions further than what they are obliged to do under the regulation. Nevertheless, the full measure of the incentive is dependant upon the distribution method of permits in the first period. Auctions are more effective than Grandfathering to stimulate economic development.⁵⁵ Auctions impose financial pressure from the beginning to decrease emissions. Grandfathering, however, allows high-emitting firms to demand a larger proportion of the initial distribution of permits, and through this, they gain an economic advantage.

V. Economic Disadvantages of Emissions Trading

1. Market Susceptibility

A market without sufficient competition can be manipulated by a large individual firm. In a perfectly competitive market, in which many large traders are active, no single trader has control over the market price.⁵⁶ If, however, only a few companies are on the market, or if a single firm is large enough to influence the price through its own market activity, the system will be at risk of not reaching the above mentioned, socially-optimal, market structure.⁵⁷

If a company has large influence on the market, it has the capacity to reduce its own compliance costs, as well as disadvantage its rivals on the market.⁵⁸ A company with monopoly power can restrict the supply of permits on the market, and in so doing, have an influence in raising the market price.⁵⁹ The result is a decrease in welfare due to too much pollution from the large firm, and too little from the affected competitors. The large firm pays too little for pollution control, and sells fewer permits than it would in a market characterised by competition, and as a

⁵⁴ Costanza, Einführung in die ökologische Ökonomik, Stuttgart 2001, p258

⁵⁵ Endres, Springer Science, 2005, p29

⁵⁶ Hanley, Environmental Economics in Theory and Practice 2nd Ed., p151

⁵⁷ Hanley, Environmental Economics in Theory and Practice 2nd Ed., p151

⁵⁸ Hanley, Environmental Economics in Theory and Practice 2nd Ed., p152

consequence, prices remain high.⁶⁰ On the other hand, a firm with monopsonistic power can purchase fewer permits, and in so doing, exert downward pressure on the prices.⁶¹

If the authority is aware of the monopoly or monopsony, it is capable of compensating for the influence of the large firm, provided that it has sufficient understanding of changes to costs and demand on the market.⁶² However, in the event of a pure monopoly, in which all permits are issued to the market power, or a pure monopsony, in which all permits are distributed from the supply adjuster, the authority has no flexibility.⁶³

2. World Trade

An international market for emissions trading is likely to encounter the same problems as other international markets. Theoretically, a single investor with sufficient means, would be able to control the future development of various industries.⁶⁴ Such disturbances could further extend the problems of irresponsible stock and currency trade.⁶⁵ Unregulated, the market for emissions permits could increase the socio-economic gap between countries, and offer an even larger advantage to those capable of moving their finances quickly, according to daily and regional market changes.⁶⁶ An international market would make the protection of biological resources susceptible to market variations.

3. Transaction Costs

Market trade normally implies transaction costs. In the case of emissions trading, this is the cost of finding a purchaser or vendor, the bargaining costs, and if required, the cost of official authorisation. Such

59 *Hanley*, *Environmental Economics in Theory and Practice* 2nd Ed., p152

60 *Hanley*, *Environmental Economics in Theory and Practice* 2nd Ed., p152

61 *Hanley*, *Environmental Economics in Theory and Practice* 2nd Ed., p152

62 *Hahn*, *The Quarterly Journal of Economics*, Vol. 99, No. 4 (Nov., 1984), p763

63 *Hahn*, *The Quarterly Journal of Economics*, Vol. 99, No. 4 (Nov., 1984), p763

64 *Tokar*, *Dollars and Sense*, March/April 1996

65 *Tokar*, *Dollars and Sense*, March/April 1996

costs affect the performance of the permit trading market. Assertions as to the cost-effectiveness of emissions trading are often exaggerated due to failure to include transaction costs in economic models.⁶⁷ In addition, if the market has transaction costs, pollution control costs and the market balance are no longer independent of the initial distribution of permits.⁶⁸ This complicates the role of the authority, which must take into account such occurrences in the planning of a pollution control strategy.

If transaction costs are present in trading, the expense of complying with pollution control increases and welfare is reduced, as exchanges which might have otherwise been mutually beneficial, may be held back.⁶⁹ Even if no trades take place, compliance costs are lower, than if for example a technology standard was to be imposed. This is because firms retain flexibility over their method of compliance.⁷⁰ Nevertheless, the attractiveness of emissions trading is diminished in comparison with other instruments that incur less transaction costs (see later, Environmental Tax).

Transaction costs may increase under international trading schemes, due to the involvement of countries with diverse cultural, political and economic backgrounds, and the related compliance, surveillance and enforcement expenses.

For these reasons, no single instrument is extensive enough to internalise external effects, and the implementation of a combination of instruments may be required.⁷¹ This may reduce the cost on the industry and the

66 Tokar, Dollars and Sense, March/April 1996

67 Stavins, Journal of Environmental Economics and Management, September 1995, 29, p133

68 Stavins, Journal of Environmental Economics and Management, September 1995, 29, p144

69 Stavins, Journal of Environmental Economics and Management, September 1995, 29, p140

70 Stavins, Journal of Environmental Economics and Management, September 1995, 29, p144

71 Goulder, Review of Environmental Economics and Policy, volume 2, issue 2, summer 2008, p167

susceptibility of the instrument due to insufficient knowledge of the market mechanism or the price-demand function.⁷²

VI. Ecological Reasons for Emissions Trading

1. Direct Environmental Protection

The dispersion of a politically pre-determined level of permits means that emissions trading has an important ecological advantage over other instruments. Emissions trading is an instrument that is suited to reaching a target level of emissions, as the precise number of permits will be issued to correspond with the desired amount of emissions. This is highly advantageous for environmental protection, because it enables exact targets to be set which are not allowed to be exceeded. In this respect, emissions trading distinguishes itself inherently from an emissions tax (see later). Emissions trading means that instead of exercising control over the price, which is not directly related to the level of emissions, the authority is able to exercise direct control over the quantity of emissions.

2. Flexibility

If new statistics or science requires targets to be changed, this is easy to implement under an emissions trading scheme. The number of issued permits, and therefore the level of emissions, can be directly changed by the authority. Contrary to an emissions tax, the price of emissions permits is flexible, but the quantity is inflexible.

3. Efficiency

If the cost of achieving environmental targets is reduced, more ambitious targets become politically plausible.⁷³ For this reason, the economic advantages of an instrument of environmental protection are also possibly ecologically beneficial.

72 *Goulder*, Review of Environmental Economics and Policy, volume 2, issue 2, summer 2008, p167

VII. Ecological Reasons against Emissions Trading

Emissions trading is implemented to correct a market failure. It is questionable whether a failure of the market can, in principle, be corrected by the market – in the case of climate change, “the greatest market failure the world has ever seen”.⁷⁴ Emissions trading is representative of an even larger ecological problem, namely, the environment is only a cause for concern if it brings about “external costs” to the economy. Environmental problems are considered market failures, problems which prevent the market from functioning optimally.

In this respect, the market is king, and a government must only intervene if the market fails to function in its role.⁷⁵ The environment only has a value to the extent that it can provide benefits for an individual.⁷⁶ As an external effect, it is only of importance if costs are found affecting it. Our western economic models are anthropocentric, exclude altruism, and are dependant on the premise that humanity is a higher form, whose needs can never be satisfied. The fact that emissions trading is based on these models raises various ecological questions.

1. Legitimation of Pollution

By setting a price and distributing rights to pollute – in order to reduce demand and actually protect the environment – paradoxically, emissions trading actually legitimises the environmentally destructive activities, provided that the price has been paid. According to the economic theory of emissions trading, the market is extended to include external effects (i.e. environmental damage). Pollution of the air or a river is given a price and restricted rights to partake in this conduct are distributed. In an economic

⁷³ Endres, Springer Science, 2005, p32

⁷⁴ Stern, Stern Review: The Economics of Climate Change; Summary of Conclusions, p3

⁷⁵ Wallert, The Political Economy of Environmental Taxes, p97

⁷⁶ Wallert, The Political Economy of Environmental Taxes, p97

sense, clean air, for example, has a monetary value that can be bought or sold.

The question asked by environmentalists is whether the best mechanism to protect the environment should involve the granting of rights for the conduct that the authority is actually trying to prevent. Of course, the idea is to progressively restrict these rights and demand a preventative payment that was not previously in place.

Nevertheless, after such permits have been created, even if they are extremely sparse as a measure of environmental protection, society has accepted their use. This may be problematic if new research indicates a need to lower emissions below the levels currently accepted, based on the number of permits that have already been issued. This essentially reduces the range of issues that might be able to be combated by such measures, as the range of pollutants that causes environmental damage is vast – from heavy metals, to pesticides, liquid wastes or radiation – and not limited to a handful of greenhouse gases. After a financial value has been attached to a part of the environment, society has implicitly accepted that it is purchasable, tradable and disposable. The environment is evaluated, and the right to pollute it, is traded as any other good, not for its exploitation, but for its protection.

2. Unifying Economics with Ecology

Success of emissions trading is dependant on environmental problems being successfully integrated into the market system. The anthropocentric market is extended, to include the ecology. The problem lies in the fact that the fundamental basis of our existence is not our economy, a human phenomenon, but rather our ecology and environment.

The current topic, emissions trading for the purpose of environmental protection is interesting, because it attempts to unify these phenomena, by

integrating environmental damage into our economic models. Our economy remains the fundamental constant into which our ecology, through emissions trading, is integrated. Economics is classically defined as the study of limited resources.⁷⁷ The extraction of these resources takes place in the environment. This simple fact demonstrates the dependence of our economics on our environment. The environment is the foundation upon which our economics are based.

In actual fact, our ecology is the fundamental constant, into which our economics – a subset of only one species – should be integrated. There exists a fundamental contradiction between the finite and diverse nature of the ecology, and the economy, which reduces everything to single commodities for their exploitation, to promote the single insatiable goal of maximising individual profit.⁷⁸ To solve existing environmental problems, more than a propagation of existing economic theory is required, manifest in the false premise of internalising external environmental effects into the market process, which itself leads to a series of ecological questions and extends anthropocentricity.

3. Environmental Evaluation

As mentioned under Total Permits, in preparation for an emissions trading system, the authority must set the total amount of permits to be supplied, according to their conclusion on the environmental cost to be incurred by allowing that number of permits onto the market. To calculate the optimal level of pollution, which is most socially acceptable, a value must be attached to the environment, to enable possible environmental degradation to be understood in the same financial terms as other economic phenomena. This enables a comparison to be undertaken, the rationale of which, might involve a prioritisation to be made between

⁷⁷ Robbins, *An Essay on the Nature and Significance of Economic Science*, 2nd Ed., 1932

⁷⁸ Tokar, *Dollars and Sense*, March/April 1996

improved environmental standards and full employment or economic growth.

However, this approach denies the existence of certain environmental values, which are beyond the scope of economics, qualitative characteristics, which cannot be grasped monetarily or economically – e.g. improved standard of living, protection of a threatened species, or conservation of a historic or scenic location.⁷⁹ These are environmental features, irreplaceable by nature, and inestimable in value. Their true worth cannot be encapsulated by the market.⁸⁰

In any event, the environment can only be internalised into our economic models to the extent that our economics acknowledge and represent the value of the environment. However, finite monetary values are unable to encapsulate the value of an eco-system.⁸¹

To function comprehensively as a method of environmental protection, values must be set, to protect all fundamental aspects of a sustainable eco-system. If this is not a desired result, it demonstrates that if at all appropriate, emissions trading must be used in conjunction with other instruments of environmental protection that are not dependant on arbitrary environmental evaluations. This is due to the fact that no value having been attached to an aspect of the environment, does not necessarily mean that this aspect has no value. Furthermore, important ecological interactions and connections are not included, if the components of an eco-system are evaluated in isolation from one another.⁸²

79 *Hussen*, Principles of Environmental Economics: Economics, Ecology and Public Policy 2nd Ed., p164

80 *Hussen*, Principles of Environmental Economics: Economics, Ecology and Public Policy 2nd Ed., p160

81 *Hussen*, Principles of Environmental Economics: Economics, Ecology and Public Policy 2nd Ed., p163

82 *Hussen*, Principles of Environmental Economics: Economics, Ecology and Public Policy 2nd Ed., p163

4. Reactionary Nature of Emissions Trading

Due to the market model, emissions trading is a policy that can only be implemented after the emergence of an environmental problem. In practice, external effects and market failures arise, before emissions trading is implemented. The fact that all emissions are acceptable if there is no emissions market, does not dictate that no emissions are acceptable unless there is an emissions market. The problem is to regulate the market effectively, as emissions trading is the response to a pre-existing problem. Its use is restricted and would it be inappropriate, if for example, emissions were the cause of extinction to a species of animal or plant. Emissions trading is more useful if the full range of threats to the environment are known and understood, and a reactionary policy would be of no consequence to the sustainability of the ecosystem.

Emissions trading acts more as a measure of damage control, than as a method of environmental protection. This damage, or according to economic theory, "external effect", is a pre-requisite for the implementation of emissions trading. Clearly, it also functions to protect the environment from further degradation, but the fundamental basis of Coase and emissions trading economics, is to respond to an external effect. The historical tendency of emissions trading implementation is as a reaction against an already existing problem, for example, acid-rain, chlorofluorocarbons and climate change.

Emissions trading does in fact function as an economic instrument of environmental protection. However, this takes place within a system that merely considers the finite environment as the source for the ever-expanding, and insatiable, capitalist machine of western civilisation. If environmental degradation is to be truly encountered, a deeper change to attitudes over the environment is required than that which is revealed by trading permits.

The dilemma is that even if emissions trading appears to be an environmentally effective and economically efficient option, its implementation means the spread of the capitalist and free-market values, which were in fact, from the beginning, the cause of the emissions problem.

VIII. Emissions Trading Compared to other Instruments

1. Command and Control

Depending on the situation, political decision makers may also enact non-market measures, such as technological demands and standards of operation.

Under a command and control based regulation, every polluter would be forced to comply with the environmental standard.⁸³ If, for example, human health was at stake due to the conduct of a certain industry, outlawing the conduct through regulation might be the appropriate measure (e.g. the use of asbestos).⁸⁴ Such regulation can also be used to bring about a reduction, and is therefore, an alternative to economic measures.⁸⁵

As regulation pays no attention to the associated costs of the industry, the comparative cost efficiency of emissions trading is very high. Emissions trading enables the most cost effective reduction of emissions across the entire industry to take place. Should, however, a more immediate danger exist, such that the emission of a certain substance must immediately end, emissions trading would not be an appropriate measure.

If no immediate danger exists, emissions can be progressively reduced. In these cases, command and control is not economically attractive. Contrary

⁸³ Wallart The Political Economy of Environmental Taxes, Massachusetts, p18

⁸⁴ Wallart The Political Economy of Environmental Taxes, Massachusetts, p18

⁸⁵ Wallart The Political Economy of Environmental Taxes, Massachusetts, p18

to market based mechanisms, it provides no incentive for firms to reduce their emissions further than what the regulation requires. Emissions trading shares this advantage with an environmental tax.

2. Pigovian or Environmental Tax

A taxation based solution to an environmental problem imposes a tax on the polluter, the size of which should correspond exactly to the amount of damage.⁸⁶ While emissions trading involves control of the quantity of emissions, an emissions tax focuses on control of the price. The tax guarantees the generation of state revenue.

An emissions tax decreases the demand of a product due to the higher price. Authorities can use it to exercise direct influence over the price, but not directly over the quantity.

In its use of an environmental tax, the authority must estimate what the appropriate level of taxation is to achieve the desired level of emissions reduction.⁸⁷ Effective environmental protection is therefore dependant on the ability of the authority to set the correct level of taxation, as well as the responsiveness and adaptability of the economy. The difficult task of correctly adjusting levels of taxation, such that the target emissions reduction takes place, is dependant upon numerous economic variables, which may result in too much or too little reduction.

The guiding mechanism of emissions trading is not the price, but rather the quantity. This means, in contrast to an environmental tax, that the desired level of emissions should not be exceeded.⁸⁸ Thus an environmental tax involves an additional ecological risk to emissions trading.

⁸⁶ Zimmer, CO₂-Emissionsrechthandel in der EU, S. 70

⁸⁷ Wallart, The Political Economy of Environmental Taxes, Massachusetts, p20

⁸⁸ Zimmer, CO₂-Emissionsrechthandel in der EU, p84

Nevertheless, as a market mechanism, an environmental tax has some characteristics common to emissions trading. Companies which are able to reduce their emissions more efficiently than paying the tax, will carry out the reduction, while the others will pay the tax – congruent with the acquisition of emissions permits. In this way, an emissions tax also acts as a stimulatory economic instrument.

If guaranteed revenue is a higher priority than reaching a pre-determined level of emissions, an emissions tax provides the government with a better alternative. The most suitable instrument remains dependant on the “characteristics of the specific environmental problem, the social, political, and economic context in which the instrument is to be implemented”.⁸⁹

IX. Case Examples of Emissions Trading

1. Sulphur-dioxide (SO₂) Trading in the United States

The most ambitious emissions trading system in its day was the sulphur-dioxide trading arrangement established in the United States in 1990 with *Title IV of the Clean Air Act Amendments*.⁹⁰ These amendments applied to reduce emissions of SO₂ in the USA to 50% of the 1980 levels by 2000, primarily as a measure to combat acid rain.

Banking was a feature of the system. If emissions by a company exceeded the level authorised by permits, it would be fined \$2000 per tonne and be issued a requirement to compensate with an additional reduction in the following year matching the excess.⁹¹

⁸⁹ Stavins, *Journal of Economic Perspectives*, volume 12, issue 3, Summer 1998, p85

⁹⁰ Stavins, *Journal of Economic Perspectives*, volume 12, issue 3, Summer 1998, p70

⁹¹ Stavins, *Journal of Economic Perspectives*, volume 12, issue 3, Summer 1998, p71

SO₂ emissions trading in the USA provided useful lessons in the planning and implementation of emissions trading systems. It demonstrated that if a private market is well designed, it acts to minimise transaction costs, which in turn helps permits to function as intended.⁹²

Estimates in 1990 predicted that the costs and benefits of the programme would be approximately equal.⁹³ But calculations later concluded the costs were greatly exceeded by the benefits. Although the original intention of SO₂ reduction was to prevent the acidification of forests and aquatic ecosystems, great benefit was derived from the decreasing risk of early human death due to contact with sulphates.⁹⁴ SO₂ emissions trading was successful in reducing costs, and at the same time, achieving the environmental objectives.⁹⁵

2. Emissions Permits in the Context of Climate Change

The problem of climate change is a typical example of an external effect. In fact, the Stern Review, which was commissioned by the British government and reported comprehensively on the economic effects of climate change, stated that it was the “greatest market failure the world has ever seen”.⁹⁶ Current energy costs contain, or until recently, had contained no account of the effects on climate.⁹⁷ As a result, the choice of coal was not financially discouraged, and the market failed to entice industry to renewable alternatives.

According to the latest report of the International Panel on Climate Change – an international committee of hundreds of leading scientists – the

⁹² *Stavins*, Journal of Economic Perspectives, volume 12, issue 3, Summer 1998, p83

⁹³ *Stavins*, Journal of Economic Perspectives, volume 12, issue 3, Summer 1998, p71

⁹⁴ *Stavins*, Journal of Economic Perspectives, volume 12, issue 3, Summer 1998, p71

⁹⁵ *Stavins*, Journal of Economic Perspectives, volume 12, issue 3, Summer 1998, p78

⁹⁶ *Stern*, Stern Review: The Economics of Climate Change; Summary of Conclusions, p3

⁹⁷ *Walker*, Ganz heiß, p182

majority of observed increases in global temperatures are very probably linked to anthropocentric greenhouse gas concentrations.⁹⁸

If this trend continues, the earth and its inhabitants will be met with numerous and wide-ranging consequences:⁹⁹

- threatened supplies of drinking water
- the strength of many eco-systems will be tested by a never before seen combination of disturbances connected to climate change, such as floods, droughts and fires
- damaging effects to health, such as malnutrition, diarrhoea, cardio-respiratory sicknesses and infections
- up to 30% of animal and plant species will be threatened by extinction

In addition, many atolls and islands will have to be evacuated due to raising sea-levels, bringing the world to an era of “environmental” or “climate” refugees. This is already evident at the Pacific Island of Tuvalu, whose government has sought refugee status for the entire population in neighbouring Australia and New Zealand.

The economic consequences of progressive climate change match the far-reaching ecological prognosis. The Stern Review estimated, according to results from economic models, that without combating action the overall cost of climate change every year – now and permanently – would amount to 5% of global GDP.¹⁰⁰ With the inclusion in the economic models of a larger – but possible – range of incidents and risks, the estimates of damage rise to 20% of GDP or more.¹⁰¹ On the other hand, the cost of action – decreasing emissions of greenhouse gases to avoid the most

98 Intergovernmental Panel on Climate Change, *Climate Change: Synthesis Report 2007*, p39

99 Intergovernmental Panel on Climate Change, *Climate Change: Synthesis Report 2007*, p48-54

100 *Stern*, *Stern Review: The Economics of Climate Change; Summary of Conclusions*, p1

101 *Stern*, *Stern Review: The Economics of Climate Change; Summary of Conclusions*, p1

harmful consequences of climate change – may amount to no more than 1% of global GDP.¹⁰²

With such a threatening list of economic and ecological risks, the question of implementing emissions trading, as an economic instrument of environmental protection and a method of combating global climate change, increases markedly in importance.

a. Kyoto Protocol

The urgency of cost-efficient climate policies were stressed in the United Nations Framework Convention on Climate change.¹⁰³ The Kyoto Protocol of 1997 prepared a legal framework for the reduction of greenhouse gas emissions in the campaign to combat climate change.

Industrialised nations, referred to in Appendix A/B of the Kyoto Protocol, are required to reduce their emissions in the time frame 2008-2012, in comparison to the base year 1990.¹⁰⁴ The protocol included three mechanisms to increase flexibility in the process of reducing emissions: Joint Implementation, the Clean Development Mechanism, and Emissions Trading.

b. European Union Emissions Trading Scheme (EU ETS)

The EU ETS is the largest emissions trading system in the world. It aims for a reduction in emissions by energy supply companies and factories through the trade of CO₂ emissions permits. EU member states are required to observe two limits on emissions: the first, from the Kyoto Protocol, is a limit on yearly emissions obligating the 25 EU countries by 2008-12; the second limit is the EU ETS total, which must be reached by the industry in each individual country.¹⁰⁵

102 *Stern*, Stern Review: The Economics of Climate Change; Summary of Conclusions, p1

103 See Article 3, Kyoto Protocol to the United Nations Framework Convention on Climate Change

104 Article 3, Kyoto Protocol to the United Nations Framework Convention on Climate Change

105 *Convery*, Review of Environmental Economics and Policy, volume 1, issue 1, winter 2007, p90

c. Possible Future Prognosis

Climate change is a problem that will affect certain countries and regions more severely than others. The success of an instrument against it depends also on countries that will not be as harshly affected, as well as developing countries, which are not responsible for the emergence of the problem.

Leading scientific evaluation favours an international agreement, demanding emissions to be reduced as far as possible.¹⁰⁶ However, the higher the demands on countries, the less likely it will be to secure their joining and reach the political, economic and technical goals.¹⁰⁷

In December 2009 a UN conference on climate change will be held in Copenhagen, to reach an agreement beyond the Kyoto Protocol and 2012. The results of these negotiations may be decisive of the future of climate change and emissions trading policies.

The basis year for the next agreement is disputed. If, as with the Kyoto Protocol, it refers to 1990, former eastern-block countries would hold vast wealth in emissions rights due to their economic recession in the 1990s. Another option would be 2010; however, this may raise objections from some in the international community, as it would reward the indifference shown by the USA to the climate change alleviation politics of recent years.¹⁰⁸

The results of this conference are likely to show whether the will to overcome impending problems is more transcendent of national boundaries and more foresighted, than current circumstances would suggest.

¹⁰⁶ Walker, Ganz Heiß Berlin 2008, p201

¹⁰⁷ Walker, Ganz Heiß Berlin 2008, p201

¹⁰⁸ Walker, Ganz Heiß Berlin 2008, p201

X. Legal Problems

1. Polluter-Pays Principle

Under international environmental law, the polluter-pays principle is an important instrument of environmental protection. According to the principle, national authorities should endeavour to “promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment”.¹⁰⁹

If emissions trading commences with an auction, it is in accordance with the polluter-pays principle. The polluter is burdened with the price of the damage, similar to other economic instruments (e.g. an environmental tax), to internalise the negative external environmental effects.

Grandfathering, however, does not comply with the polluter-pays principle. With grandfathering, the polluter does not purchase its right to emit and the state receives no revenue.¹¹⁰ Grandfathering means that current emitters profit from the introduction of emissions trading, precisely to the extent which they are currently causing destruction to the environment.¹¹¹

Grandfathering results in a “wealth transfer from the public to the polluter”.¹¹² The polluter receives an asset with a tradable value, improving the financial status of the company.¹¹³ The EU has conceded that the EU ETS - which stipulates the use of grandfathering to distribute at least 95%

¹⁰⁹ Article 16, Rio Declaration on Environment and Development

¹¹⁰ Woerdman, Review of Law and Economics 4 (2), p583

¹¹¹ Costanza, Einführung in die ökologische Ökonomik, p254

¹¹² Woerdman, Review of Law and Economics 4 (2), p583

¹¹³ Woerdman, Review of Law and Economics 4 (2), p583

of permits from 2005-2007 and 90% of the permits from 2008-2012 – does not comply with the polluter-pays principle.¹¹⁴

2. Property Rights

An emissions trading system should be designed in a manner enabling the total emissions to be reduced, should such a need arise. After a company has purchased a permit, legally, it is in a strong position to prevent this permit from being withdrawn, in the even that new information should be revealed or circumstances change.¹¹⁵ On the other hand, a company may be able to argue that more permits should be distributed, if new discoveries demonstrate that the previous standard was too stringent.¹¹⁶

3. Multiple Jurisdictions and Emission Leaks

If an emissions trading system is implemented in a particular jurisdiction, there is a risk that any reduction in the level of emissions will simply be balanced out with an increase in another jurisdiction. There are two different ways in which this could take place: the increased cost of production may lead companies to relocate to another jurisdiction; or, demand may reduce due to an increase in price, but as consumers search for better value for money, demand and emissions increase in other jurisdictions not necessarily participating in permit trading.¹¹⁷ A possible method of combating this is the negotiation of international or inter-jurisdictional programmes, in order to maximise the cost-efficiency of trading, and at the same time make an emissions leak less likely.

This issue is particularly relevant in regards to CO₂ emissions and climate change, and forms part of the long held argument of the USA against validation of the Kyoto Protocol.

114 European Parliament (EP). 2002. Report on the Proposal for a European Parliament and Council Directive Establishing a Scheme for Greenhouse Gas Emission Allowance Trading within the Community and Amending Council Directive 96/61/EC. Final A5-0303/2002 Par1(RR/477361EN.doc), 13 September. Brussels: European Parliament. p52

115 Hahn, Journal of Risk and Uncertainty, Springer, vol. 3(4), p359

116 Hahn, Journal of Risk and Uncertainty, Springer, vol. 3(4), p359

117 Goulder, Review of Environmental Economics and Policy, volume 2, issue 2, summer 2008, p170

4. Burden Division in International Agreements and Enforceability

The question of who is to carry the burden of reducing emissions is extremely important regarding the implementation of emissions trading as a measure of combating climate change. To avoid an emissions leak, it is essential that as many countries as possible are involved in the emissions trading system. The problem is that the success of emissions trading is also dependant on the participation of developing countries, to combat a problem for which they were scarcely responsible.

A modification of emissions borrowing has been suggested in agreement negotiations. The so-called "Brazilian suggestion" from the Kyoto discussions in 1997, would involve the burden of current emissions reductions to reflect the historical contribution to the problem.¹¹⁸ This would mean that early industrialised countries such as England and Germany already began to borrow their emissions rights in the industrialisation of the 18th century.¹¹⁹

The success of emissions trading to combat greenhouse gas emissions may also be threatened due to the difficulty in enforcing international agreements. A state may be reluctant to set and enforce ambitious targets, knowing the impact this may have on their industry and its competitive advantage. The high cost and difficulty in enforcement may increase the risk of states acting irresponsibly.

XI. Conclusion

Emissions trading is an effective instrument to reduce emissions. It is very efficient in comparison to command and control and better suited to regulating the total of emissions in comparison to an environmental tax, which affects direct change to the price, but not to the quantity.

¹¹⁸ Walker, Ganz heiß, Berlin 2008, p203

Nevertheless, emissions trading takes place within the bounds of the free market economy, in which environmental degradation is considered nothing more than a market failure. The environment remains external to market models, rather than its crucial basis, and as an external effect that, depending on the desire or need, can be arbitrarily integrated into the market. Our anthropocentric economic models are only now beginning to recognise the environment and not just resources. But they remain anthropocentric and attempt to integrate the environment into the economy, which as a financial operation, does not do justice to its full importance.

The environment is the basis upon which humanity and the human economy is dependant. But the free market and commoditisation principles, which have lead to so many current dilemmas, will be further entrenched with implementation of emissions trading. While the popularity of considering the environment as a tradable good continues to grow, its sustainability for humanity remains under high threat.

¹¹⁹ Walker, Ganz heiß, Berlin 2008, p203