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Article — Digitized Version

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Intereconomics

Suggested Citation: Michaelowa, Axel (1995) : Joint implementation: a promising instrument for climate protection, Intereconomics, ISSN 0020-5346, Nomos Verlagsgesellschaft, Baden-Baden, Vol. 30, Iss. 4, pp. 163-171,
<https://doi.org/10.1007/BF02928087>

This Version is available at:

<https://hdl.handle.net/10419/140503>

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Axel Michaelowa*

Joint Implementation: a Promising Instrument for Climate Protection

The first Conference of the Parties to the UN Framework Convention on Climate Change opened the path for a new policy instrument to mitigate anthropogenic climate change. It instituted a pilot phase for international emission offsets, "Joint Implementation", open for all signatories to the Convention. During the pilot phase, however, emission reductions achieved abroad cannot be credited to domestic emission targets. By 2000, a decision on crediting and the final structure of the Joint Implementation regime must be taken by the Conference of the Parties.

It is highly probable that the increasing trace gas emissions associated with human activities lead to a warming of the earth's atmosphere. According to the latest climate models projections, the anthropogenic greenhouse effect will cause a global temperature increase of $1\text{ }^{\circ}\text{C} \pm 0.5\text{ }^{\circ}\text{C}$ by 2030 and of approximately $3\text{ }^{\circ}\text{C}$ by 2100. The level of environmental damage resulting from climate change probably correlates positively with the rate of global warming. There is a consensus among scientists that anthropogenic greenhouse gas emissions must be reduced by at least 60% if this damage is to be minimised.¹ There has so far been little incentive to reduce emissions since many important greenhouse gases cause no local or regional environmental damage and use of the earth's atmosphere has been free of charge. Nor can the "polluter pays principle" be applied because damage occurs at a global level and only after a certain time lag. A global climate protection policy is therefore necessary which must include all the nations of the world in order to avoid free-riding by individual countries. A first step was made in this direction when the Framework Convention on Climate Change was passed at the UN Conference on Environment and Development in 1992. The industrialized countries committed themselves therein to reduce their greenhouse gas emissions to 1990 levels within an unspecified period of time, but the interpretations of this goal differ. The developing countries did not submit to any obligations. Altogether the Convention remained very vague.

If the implementation of global, efficient instru-

ments such as an international greenhouse gas tax or a global system of tradeable emission rights² is not feasible, the efficiency with which national reduction targets are reached can be increased through Joint Implementation. A country must implement an emission-related tax or regulatory measures as a prerequisite for Joint Implementation. Crediting emission reductions achieved abroad to national reduction targets must be permitted by international law. Emitters in the home country who can prove emission reductions abroad are granted relief from emission-related tax payments or regulations in proportion to the emission reductions achieved.

Situation before Joint Implementation (cf. Fig. 1a): Company U_A pays the government R_A , which is committed to a national reduction target, an emission tax on its emissions $E(U_A)$. Company U_B emits a volume of greenhouse gases $E(U_B)$ without any restrictions from its government R_B . Let $E(U_A) = E(U_B)$ in this example.

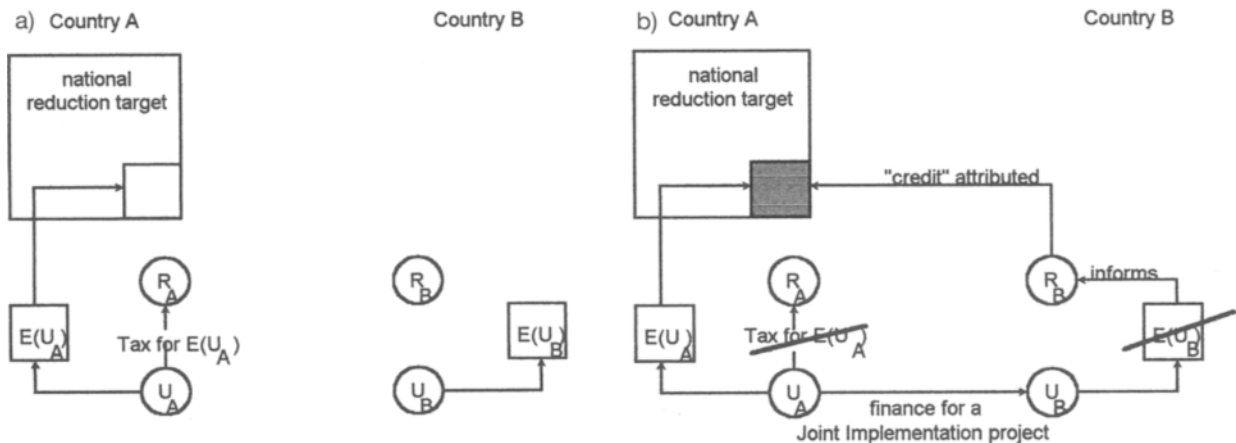
Situation after Joint Implementation (cf. Fig. 1b): The reduction project financed by U_A completely eliminates U_B 's emissions $E(U_B)$. The government R_B is informed of the reduction which is then attributed to Country A's reduction target. The government R_A

¹ Cf. M. Grubb, A. Rose: Introduction: nature of the issue and policy implications, in: UNCTAD (ed.): Combating global warming, New York 1992, p. 3.

² These instruments have been the subject of numerous studies in recent years. Cf. A. Michaelowa: Joint Implementation of greenhouse gas reductions under consideration of fiscal and regulatory incentives, HWWA-Report No. 153, Hamburg 1995, pp. 7-12. The actual implementation of these instruments entails a lot of difficulties. In case of a tax, a global emission target can be reached only through complex fine-tuning. The distribution of tax income depends on a lot of different interests. Concerning emission rights the problem of initial allocation is linked to difficult distributional issues. Moreover, transaction costs can lower the efficiency of emission right trading.

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Figure 1
How Joint Implementation works



grants U_A tax concessions which, in the example, correspond exactly to the tax burden created by $E(U_A)$, since $E(U_A) = E(U_B)$. Total emissions are thus reduced by 50%.³

Joint Implementation is a flexible instrument which reduces the international distributional problems associated with tradeable emission rights or taxation. Without needing to establish a global target, the most economical reduction opportunities are utilised worldwide and national targets are reached efficiently. Companies, non-governmental organisations and individuals can all participate. The competitive distortion feared by industry in the case of unilateral climate policy using emission taxation or regulatory measures⁴ can be mitigated since emission-intensive industries are able to reduce their tax and regulations burden by taking part in Joint Implementation projects. The shock of structural change required by environmental policy is thus cushioned and short-term frictional costs, which could otherwise lead to social tensions, are reduced. Given the possibility of Joint Implementation, fewer job losses in the emission-intensive industries can be assumed while job gains in industries which offer energy-efficient technologies can be expected. However, past experience indicates that high environmental expenditures do not lead to significant changes in trade flows.⁵ The probability of significant leakage as a result of unilateral climate policy therefore is rather low.

There is also a voluntary transfer of resources to the developing countries and the countries in transition where the least costly reduction options are to be found. Successful Joint Implementation projects can

increase awareness of the climate issue in the host countries and strengthen domestic efforts. They can also help avoid bad investments in energy-intensive and emission-intensive technologies which would otherwise lose their value prematurely when the inevitable transition to a climate-friendly economy takes place. Broad acceptance of Joint Implementation can only be achieved if transaction costs are minimised, if there are guaranteed advantages for all the participating private and public sector partners, and if there are transparent criteria and few regulations.

Reservations about Joint Implementation

At the instigation of Norway and Germany, Joint Implementation was introduced into the Framework Convention on Climate Change. However, during preparations for the Conference of the Parties at the Intergovernmental Negotiating Committee (INC) it became clear that there were problems regarding the interpretation of these principles.⁶ Some developing countries fear that Joint Implementation represents an attempt by the industrialised countries to buy their way out of reduction commitments, and therefore demand that Joint Implementation be restricted to the

³ U_A could change its behaviour, leading to an increase in $E(U_A)$. It must, however, pay tax on the additional emissions as before. In this way, there is no incentive to increase emissions in the home country.

⁴ This argument is used frequently. Cf. e.g. Federation of German Industries: Changing course with eco-taxes?, Cologne 1994. Attempts to quantify the total leakage effect of trade and production relocation are extremely divergent and methodologically controversial.

⁵ Cf. P. Sorsa: Competitiveness and environmental standards: some exploratory results, World Bank Policy Research Working Paper No. 1249, Washington 1994.

industrialised countries. Economic efficiency here takes a back seat to political considerations. It is also feared that Joint Implementation projects, over which the host country's government has no right of disposal, will displace public transfers to developing countries. Against this view it can be objected that prohibiting Joint Implementation could reduce future concessions from the industrialised countries since their reduction costs increase if the Joint Implementation option is lost. Some developing countries think there is a danger of Joint Implementation projects exhausting the "cheap" reduction options such that when emission targets are established for their countries at a later date, these targets can only be reached at a higher cost. One possible procedure, taking previous Joint Implementation emission reductions into account when establishing reduction targets, would entail double counting of emission reductions and must therefore be rejected. It must also be borne in mind that the reductions achieved by Joint Implementation projects do not cost the host country anything and that the initial situation is thus better than if they had to finance the "cheap" reductions themselves.

It is also argued that Joint Implementation slows down the rate of innovation since the pressure to innovate declines in the industrialised countries.⁷ Since Joint Implementation does not replace domestic reductions in the short to medium term but can only complement them, this fear seems unfounded. Besides, pressure on the industrialised countries does not automatically lead to an increase in research activities. On the other hand, Joint Implementation could help speed up technology development and technology transfer since a global market for environmental technology would develop. Adapting technologies to conditions in the developing countries would become more attractive.

Joint Implementation projects could displace projects which would otherwise have been carried out autonomously by the host country. However, since

most host countries have hitherto failed to provide any incentives as part of a climate policy and do not themselves appear to be making efforts towards emission reduction, this problem is practically irrelevant.

As Joint Implementation takes place on a voluntary basis, any country which does not accept this instrument can decline participation. However, governments in industrialised countries should not regard private Joint Implementation projects as a substitute for development aid and should not reduce their development budgets accordingly. In order to make Joint Implementation widely acceptable after the pilot phase, it is crucial that the industrialised countries rigorously implement domestic measures which not only reduce greenhouse gas emissions but which are also profitable for the national economy. Such measures include dismantling coal subsidies and providing incentives to increase energy conservation. Given Joint Implementation, emission reductions in the industrialised countries can be spread over a longer time period while the emission efficiency of production growth in the developing countries is substantially improved. Given unchanged worldwide emission reduction costs, Joint Implementation facilitates a higher global emissions reduction than is possible under a climate policy which is restricted to the industrialised countries. If the political aim is to achieve the same emissions reduction with Joint Implementation as without it, then the costs of this reduction will be lower. The question of whether to aim for a higher level of emissions reduction at the same cost or the same level of emissions reduction at reduced cost requires a political solution.

Forms of Joint Implementation

There are several different conceptual frameworks for Joint Implementation:

☐ Within a multilateral framework, countries wishing to invest in Joint Implementation make contributions to an independent fund while other countries offer Joint Implementation projects and so compete for the fund's resources. Projects are selected according to their emission reduction efficiency and positive externalities can be taken into account in the case of equally efficient projects. For the duration of the project, each investor country receives an emission credit proportional to its share of the project portfolio. However, this approach involves a range of primarily institutional inefficiencies and is therefore unacceptable.

⁶ At three sessions of the INC there was a heated debate on Joint Implementation. See e.g. INC: Matters relating to commitments – criteria for Joint Implementation, Comments from Parties or other member states, A/AC.237/Misc. 37, Geneva 1994; INC: Matters relating to commitments – criteria for Joint Implementation, in: Kilaparti Ramakrishna (ed.): Criteria for Joint Implementation under the Framework Convention on Climate Change, Woods Hole Research Center, pp. 51-58, 1994; INC: Matters relating to commitments – criteria for Joint Implementation, Comments from member states on criteria for Joint Implementation, A/AC.237/Misc.33 and Add., Geneva 1993.

⁷ Cf. N. Dubash: Commoditizing carbon: Social and environmental implications of trading carbon emissions entitlements, Master's Thesis, Berkeley 1994.

□ Joint Implementation can be arranged by governmental agreements between two states. States can carry out their own projects on a national, regional or municipal level. The municipal level seems particularly promising since local authorities have a large influence on energy generation and consumption, particularly in the household and transport sectors. They often have strong ties to twin cities abroad. Another possibility is for the state to commission private companies and organisations to carry out Joint Implementation projects. Most important is the conclusion of a framework agreement for the independent activities of private companies and non-governmental organisations. State authorities must be informed of the progress projects are making before issuing a certificate of approval. A number of pilot projects are already running on the basis of bilateral agreements.⁸ For example, a Dutch public company is carrying out reforestation projects in a number of countries.⁹ The USA has recently signed framework agreements with Costa Rica and Chile.

□ Companies have an interest in investing in Joint Implementation projects for a number of reasons. If Joint Implementation projects reduce their domestic tax and regulatory burdens and if the project's costs are less than the tax burden or the cost of regulations, then companies can reduce their net burden. Also of significance are marketing considerations¹⁰ and the fear of existing fiscal and regulatory regulations being tightened or new regulations being introduced. Not least through Joint Implementation, companies can gain a foothold in developing markets. Project hosts receive new technologies and capital transfers. If a global agreement on Joint Implementation and crediting procedures cannot be reached, concessions for emission reductions abroad can nonetheless be granted on a national level. Private projects have advantages over state-run Joint Implementation projects in that inefficient bureaucracies can be bypassed, additional capital can be mobilised, and transaction costs can be kept to a minimum. This is particularly true of multinational corporations.

□ Non-governmental organisations (NGOs) have an annual transfer potential of over 10 billion US\$ at their disposal. They should therefore be given the opportunity to take part in Joint Implementation projects and should receive a reimbursement which corresponds to the tax concessions granted to companies as a result of Joint Implementation projects. NGOs can carry out projects in areas which are unattractive for companies or governments. These could be projects with a large number of participants

and small financial budgets, projects which run counter to government priorities, or such projects which involve training programmes or the dissemination of information. However, many NGOs reject Joint Implementation projects, since they demand massive changes in the industrialised countries' economic structures and consumer behaviour before reduction activities take place in the developing countries.¹¹ It is therefore unlikely that NGOs will offer projects immediately. Nonetheless, they are probably pragmatic enough to recognise the advantages of the concept after an introductory phase. This will probably be true of NGOs in the developing countries in particular. However, individual environmental NGOs in the industrialised countries are also positively disposed towards the concept of Joint Implementation.

Baseline Scenarios

Joint Implementation should include as many greenhouse gases as possible in order to achieve the emission target efficiently. Emissions must be verifiable, which currently limits Joint Implementation to carbon dioxide and methane.¹² Further gases should be added as soon as verification is possible. Since what matters is reducing the rate of global warming in order to allow ecosystems time to adjust, the global warming potentials for a 20-year time span¹³ should be applied when making an evaluative comparison of Joint Implementation projects. Any adjustments made to emission factors or global warming potentials as a result of scientific research progress should be applied only to new projects, while ongoing projects are allowed to continue as before.

There is a very wide range of meaningful projects which can lead to a creditable reduction of greenhouse gas emissions. Besides emission reduction measures, sequestration measures should

⁸ For a description of ongoing Joint Implementation projects see Joint Implementation Quarterly, No. 1, 1995. At the moment, at least 15 projects are already being implemented and many more are "in the pipeline".

⁹ See Face Foundation: Face Foundation in practice, Arnhem 1995; Face Foundation: 1994 annual report, Arnhem 1995.

¹⁰ The E 7-initiative of leading energy utilities providing expertise to developing country utilities is a good example.

¹¹ Cf. Climate Network Europe: Joint Implementation from a European NGO perspective, Brussels 1994.

¹² Cf. Werner Katscher, Gotthard Stein, John Lanchbery, Julian Salt (eds.): Greenhouse gas verification – Why, how and how much?, proceedings of a workshop, Bonn, April 28-29, Jülich 1994.

¹³ For the calculation of the global warming potentials see J. S. Fuglestad et al.: Direct and indirect global warming potentials of source gases, CICERO Report 1994-1, Oslo 1994.

be also taken into account. In order to measure an amount of creditable greenhouse gas reduction, it must be established how high the host country's emission levels would be without the project. Baseline scenarios must be developed in this context. Establishing baseline scenarios is also necessary for determining reduction targets within the framework of international negotiations. If realistic baseline scenarios cannot be established, then not only Joint Implementation, but every conceivable form of controlled greenhouse gas reduction policy becomes impossible. There is a danger that host countries forecast unjustifiably high emission increases. This would make them more appealing for Joint Implementation projects and excessive emission reductions would be credited. However, this problem does not arise in the case of project-specific baseline scenarios. Project-specific baseline scenarios, on the other hand, do not take indirect effects into account. For example, if carbon-rich fuels are largely substituted by low-carbon fuels, the price of the latter increases while the price of carbon-rich fuels falls. This price effect would provide an incentive for greater use of carbon-rich fuels and lead to an increase in emissions. The effects described arise in any sort of climate protection projects and not just in the case of Joint Implementation. Moreover, improved access to modern technologies via Joint Implementation can contribute to emission reductions. If it is impossible to specify whether indirect effects lead to more or less emission reduction than the project-specific baseline scenario suggests. There is, in any case, no systematic tendency for project-specific baseline scenarios to show excessive emission reductions. The possibility of quantifying indirect effects through aggregation is mitigated by the manipulability of the assumptions required in an aggregate baseline scenario. Given currently available insights, this consideration leads to the recommendation of project-specific baseline scenarios as a basis for Joint Implementation. This keeps transaction costs down.

Discount Rates for Evaluating Emission Reductions

Since Joint Implementation projects will run for different lengths of time, and reduction targets are standardised to particular years, emission reductions must be assessed at different points in time. This is done using discount rates. Without discounting, there is an incentive at state level to delay Joint Implementation emission reductions until the target year. Private investors will choose the date of any reductions according to the structure of available

fiscal and regulatory concessions. Since, as far as can be anticipated, the damage caused by climate change increases superproportionally as the rate of change accelerates, emission reductions today must be worth more than the same reductions in the future. Taking a risk surcharge into account, the discount rate for emission reductions should correspond to the weighted rate of increase of greenhouse gas concentrations. This calculation results in a discount rate of 1% to 1.5%.¹⁴ In order to operationalise discounting procedures, the Conference of the Parties should establish a discount rate for the period up to the next target date based on emission data from the last ten years. When the target date is reached, the Conference of the Parties then establishes a new discount rate based on the latest research findings.

Emission reductions can only be credited after verification has taken place. Reductions achieved abroad should be credited to the national target in full. Problems are posed by the fact that the reduction targets in the Framework Convention on Climate Change refer only to emission volumes in the target year. If the reduction achieved in the target year only is credited, then priority would be given to projects involving a one-off reduction in the target year rather than projects which reduce emissions regularly over a longer period of time. Reductions achieved in projects running for a number of years should therefore be referred to the target year. In order to do this, the sum of the discounted annual reductions must be divided by the project duration. The establishment of a cumulative or an annual reduction or stabilisation target would allow annual reductions from Joint Implementation projects to be credited without discounting.

Incentives for Technology Transfer and Development

In view of the new, stringent GATT regulations governing the protection of intellectual property, a decline in this sort of illegal technology transfer can be expected.¹⁵ Joint Implementation helps the host country develop the ability to adopt technologies, imitate and innovate. It can lead to the utilisation of great potentials for the implementation of renewable energies in developing countries. Significant learning effects and economies of scale can be achieved in the production of technologies for the utilisation of renewable energies if they are put to sufficiently wide

¹⁴ For the calculation see A. Michaelowa, *op. cit.*, pp. 66f.

¹⁵ The recent US pressure on China and the following Chinese crackdown on counterfeit manufacturers support this thesis.

use. Private investors have an interest in making the most efficient technology available since this is the only way of achieving emission reductions in the host country. Direct subsidies for technology transfer are therefore unnecessary.

Incentives for Joint Implementation

The concessions granted to companies, NGOs and individuals for reductions resulting from Joint Implementation projects depend on the instrument on which they are based. An emission tax shall be considered first. Any tax concession must be proportional to the emission reduction achieved in the Joint Implementation project.¹⁶ The emission reductions achieved are calculated from the project-specific baseline scenarios, multiplied by the relevant rates of taxation, and credited to the company's tax bill. Discounting is not necessary in this case since tax payments and emission reductions take place in the same time period. In the case of technical projects, tax credits are granted for the commercial life of the plant or equipment produced in the course of the Joint Implementation project. A suitable approximate value is the legally permitted depreciation period. Similar procedures are to be applied in the case of sequestration projects, based on the duration of emission sequestration. If the Joint Implementation project is based on training and information services, then the project's contribution to greenhouse gas emission reductions must be estimated and the tax concession calculated as above by multiplication with the rate of taxation.

A few simple examples for calculating tax concessions are given below.¹⁷ A greenhouse gas tax of 10 DM/t CO₂ is assumed. Reductions have been successfully verified.

□ Installation of new boilers improves the efficiency of a coal-fired power station by 10%. Annual emissions now amount to only 900,000 t CO₂ instead of 1 million t. The existing power station could have been used commercially for a further five years. The 100,000 t emission reduction achieved through efficiency improvements leads to an annual tax concession over five years of 100,000 t · 10 DM/t = 1 million DM. After these five years, the power station would probably have been shut down and replaced by a new one using modern technology. After the end of the old power station's commercial life, therefore, the average efficiency level of new power stations using the same fuel (taken for practical reasons from the last five years) is chosen as a standard for comparison. In this case let it be assumed that the average efficiency

level of the new power stations is 5% lower than the efficiency level of the improved power station. The creditable volume of emissions and the annual tax concession are thus halved. The newly calculated concession is granted until the the new boilers' commercial life comes to an end.

□ A new lignite-fired power station is built. As it does not replace an existing one, the average efficiency level of new lignite-fired power stations, which in this case is assumed to be 2% lower than that of the new plant, is taken as a comparative standard. Given emissions of 100,000 t CO₂, the operator can have 2,000 t recognised and so receives a tax concession of 20,000 DM.

□ A hydroelectric power station replaces a coal-fired power station which would have been used commercially for five more years and would have emitted 100,000 t CO₂ p.a. The annual tax concession thus amounts to 1 million DM for five years. For the rest of the hydroelectric power station's commercial life, the average efficiency level of new coal-fired power stations is chosen as a comparative standard; it is assumed to be 80,000 t CO₂. The tax concession is accordingly reduced to 800,000 DM.¹⁸

□ An energy utility carries out a training course for power station staff which leads to a permanent efficiency improvement of 1%. Given previous emissions of 100,000 t, a tax concession of 10,000 DM is granted for the annual reduction of 1,000 t.

□ A company carries out a reforestation project on previously fallow land. The forest stores 10,000 t CO₂ a year. The tax concession amounts to 100,000 DM p.a.

A definitive catalogue of projects considered worthy of support is to be rejected since this would restrict the variety of potential projects. A certificate issued by a state-approved company of inspectors for emission reductions achieved in a project over a certain period of time must be recognised by the tax office which then grants the corresponding tax concession.

¹⁶ The reimbursement of full costs of emission reduction abroad would be inefficient as there is no incentive to minimize costs. Nevertheless, some authors and the European Commission support such reimbursements. Cf. European Commission: Proposal for a Council directive for the introduction of a tax on carbon dioxide emissions and energy, COM (92) 226 final, Brussels 1992.

¹⁷ For general rules for the calculation of tax concessions for different projects see A. Michaelowa, op. cit., pp. 78-82.

¹⁸ If the commercial life of the hydroelectric power station is also longer than that of new coal-fired power stations used for comparative purposes, then the procedure is repeated.

Joint Implementation and a CO₂/Energy Tax

In the case of a combined CO₂/energy tax, the inefficiency arising from the energy component is reduced by Joint Implementation. Joint Implementation could therefore easily be implemented alongside a CO₂/energy tax. It is to be assumed that the German Federal Government's 25% reduction target, which is very ambitious compared with other countries' targets, can only be achieved if taxation is used to provide clear incentives for emission reduction and Joint Implementation. If, for political reasons, the short-term introduction of a national tax is not possible, then incentives must be provided for the immediate implementation of Joint Implementation projects. Thus tax credits could be amassed now to be redeemed at a later stage when the national tax legislation comes into force. This would also enable credits to be offset when a EU-wide greenhouse gas tax is introduced, assuming the EU manages to come to an agreement in the longer term. This approach will only find acceptance, however, if the future rates of taxation are specified as accurately as possible.

In this sort of case, every company should have the right to credit reductions achieved in Joint Implementation projects to their income tax and/or corporation tax debt. Concessions are calculated and their duration is determined according to the method discussed above. The companies carrying out Joint Implementation projects here will not be identical with those in the case of emission tax concessions. A particular company's tax burden, which marks the upper limit for reductions via Joint Implementation projects, is not determined by the company's domestic emissions. Companies with high emission levels but low profits or losses will have no incentive to participate in Joint Implementation, whereas the incentives for highly profitable companies with low emission levels are very high.

Subsidies for Joint Implementation Projects

NGOs must be granted direct subsidies instead of tax concessions for overseas greenhouse gas reductions. The level of subsidy is calculated in the same way as the tax concession:

□ An NGO distributes 100,000 energy-saving cookers which lead to a saving of 200,000 t CO₂ compared to the cookers used previously, the NGO receives an annual concession of 2 million DM for the average life span of the cookers.

□ An NGO carries out an information campaign with the result that the target group of 50,000 people replaces two lightbulbs with energy-saving lamps whereas the population as a whole only uses an average of one energy-saving lamp. Given an average annual CO₂ reduction of 0.7 t per energy-saving lamp, the NGO receives a yearly payment of 350,000 DM for the average life span of the energy-saving lamps.

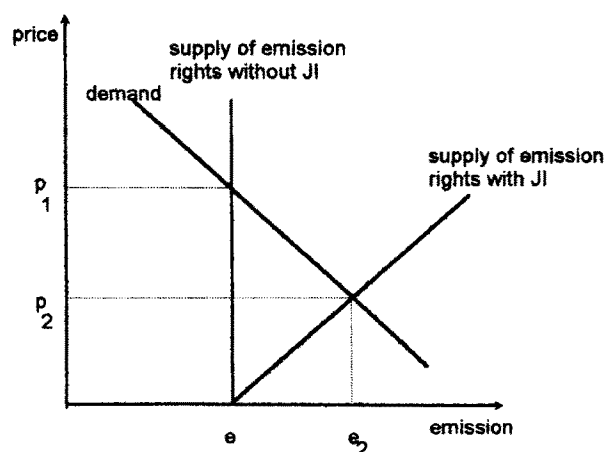
If an emission tax were not introduced, it would also be possible to subsidise Joint Implementation projects in general and to raise the necessary financial resources by increasing indirect taxes.

Tradeable Emission Rights

Instead of taxation, a system of tradeable emission rights could be introduced on a national level. Emission rights should be valid indefinitely, but must be "paid" to a certificate bank whenever an emission takes place. This bank regulates the quantity of emission rights by issuing new ones for those encashed. Regardless of the initial allocation of emission rights, Joint Implementation can be accounted for in the system. Proof of an emission reduction achieved by means of a Joint Implementation project would lead to an additional allocation of emission rights equivalent to the volume of the proven emission reduction. The incentive for a company lies in being able to either use or sell the additional emission rights. Naturally, the market price of emission rights will be the lower, the higher the reduction achieved via Joint Implementation.

In Fig. 2, without Joint Implementation, the quantity of available emission rights is fixed at e and the

Figure 2
Reduction in the Price of Emission Rights through Joint Implementation



market price p_1 will prevail. The possibility of Joint Implementation raises the quantity of available emission rights the more the higher the market price. As the quantity e_2 will be always higher than e , p_2 will be lower than p_1 .

In order to prevent an increase in domestic emissions, the volume of emission rights in circulation could be reduced by the aggregate volume of emission reductions achieved by means of Joint Implementation projects (see Fig. 3). Any new allocations would be cut proportionally. To reach a domestic emission of e , emission rights of e^* may be issued. The difference $e - e^*$ will be obtained through Joint Implementation.

Regulatory Options

Joint Implementation can in principle be combined with two forms of regulatory measures. In conjunction with the greenhouse gas emission reductions achieved overseas, the authorities temporarily forego either partially or entirely the implementation of efficiency standards or emission limits which normally apply to a particular plant. A trade-off between greenhouse gases and other harmful substances must not take place. A Joint Implementation project could, for instance, avoid having to shut down an outdated plant with a low level of efficiency as long as the additional emissions caused by the outdated plant do not exceed the emission reductions achieved by means of the Joint Implementation project. If state regulations apply externality adders in the energy utility sector, proof of emission reductions achieved in a Joint Implementation project neutralises the externality adders.¹⁹ Due to the selectivity of the regulatory framework, incentives provided for Joint

Implementation projects by regulatory measures are generally far weaker than tax incentives.

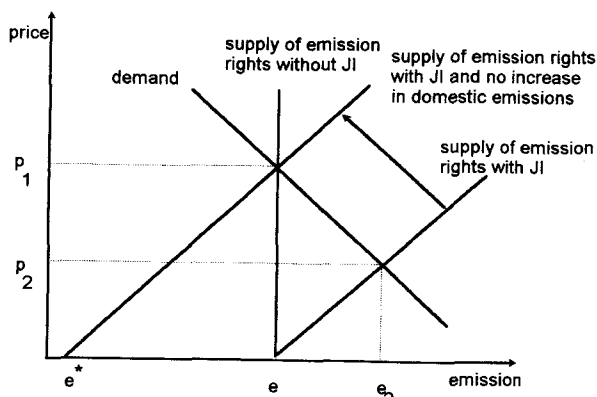
Voluntary Commitments

Voluntary commitments can only be successful if there is a threat of taxation or regulation. If taxes and regulation cannot be implemented because of political reasons there will be only a limited incentive for companies to implement measures surpassing the autonomous rise in energy efficiency. Nevertheless, voluntary commitments can be combined with Joint Implementation if there is a political will. A branch of industry represented by an association declares a goal to raise its energy efficiency. This goal must be reformulated in terms of emission quantities and can be achieved via domestic measures or Joint Implementation projects. The latter only need approval by the foreign government and have to be evaluated and verified. Companies provide appropriate data to the association to evaluate the projects.

Project Exchange and Clearing House

The participation of as many potential investors and hosts as possible can be achieved through a central "project exchange" where any interested party can gather quick, extensive information on all the Joint Implementation projects currently available as well as on corresponding financial opportunities for funding the projects. The projects are all collected in an international database, access to which is free of charge. The implementation of a national or international "clearing house" operating in the same way as a broker can take the coordination of Joint Implementation projects beyond the mere dissemination of information. A clearing house would accept and evaluate project proposals and invite tenders for projects. Project hosts specify project details in standardised form. Invitations of tenders are posted worldwide and investors can then submit applications. The emission reductions are credited to the successful applicant's home country according to the methods outlined above. In order to prevent the creation of a new international bureaucracy, a project exchange and a multilateral clearing house should be located at the Framework Convention on Climate Change's Subsidiary Body on Implementation.

Figure 3
Constant Domestic Emission with Joint Implementation



¹⁹ Externality adders are used in several states of the USA by regulatory authorities licensing new power stations. The licence will be granted only for the cheapest type of power station after consideration of the externality adder. Cf. New York State Energy Office: Draft New York State Energy Plan, New York 1994, pp. 147-177.

Verification and Sanctions

Reliable verification²⁰ is of crucial importance for the acceptance of Joint Implementation. The more intensive the verification, the higher a project's transaction costs. Every project must be subjected to independent verification. The length of verification intervals depends on the duration of the project. A national evaluation authority should carry out spot checks in order to monitor the reports of the independent verification organisations. The precise framework and implementation of national verification concepts is a matter for individual countries. Agreement on a set of international verification standards would be a good thing.

²⁰ For verification issues see Katscher et al., op. cit.

Sanctions must be imposed on the project participants if the planned emission reductions are not achieved. In the case of private projects, concessions can be correspondingly cut. Breaches of contract between private enterprises could be punished according to the rules of international civil law. A "Red List" containing all known deliberate "Joint Implementation contract breakers" could act as a deterrent. In the case of prolonged or deliberate infringements of contract, the guilty parties should be excluded, either temporarily or permanently, from the Joint Implementation system; this would be registered in the "Red List". The Conference of the Parties should establish a dispute settlement procedure for bilateral or multilateral disputes along the lines of the new GATT dispute settlement mechanism.

DEVELOPMENT INDICATORS

Irmgard Nübler*

The Human Development Index Revisited

The emergence of the Human Development Index has stimulated wide-ranging debate about its usefulness and ability to measure human development adequately.¹ This article discusses whether the HDI should be rejected in view of the criticism it has attracted, or improved, refined and more widely used.

Since 1990 the United Nations Development Programme (UNDP) has published an annual Human Development Report, in the same way as the World Bank publishes a World Development Report. Both reports include a ranking of all countries according to their "level of development". Whereas the World Development Report uses per capita income as the indicator for development, the UNDP has devised a new indicator, the human development index (HDI). Direct comparison of the two country rankings shows substantial differences for a number of countries. The HDI therefore calls into question the use of per capita income as the dominant development indicator.

Human Development and the HDI

The UNDP considers human development as a very broad concept that places human beings at the centre of development as the "real end of all activities".²

Human development is defined as a process of enlarging people's choices and relates to economic, political, social and cultural fields. The concept is universally applicable to both developing and industrial countries.³

Human development is an abstract variable that cannot be observed, and hence cannot be measured directly. Consequently, the UNDP developed a measurement concept to portray the abstract variable. In general, a measurement concept consists of three conceptual levels:

- an abstract variable, which is the ultimate criterion of interest but which is not observable and hence cannot be measured directly;

¹ See H. Trabold-Nübler: The Human Development Index – A New Development Indicator?, in: INTERECONOMICS, Vol. 26, 1991, No. 5, pp. 236-243; G. Luchters and L. Menkhoff: The Fourth Première of the Human Development Index, in: INTERECONOMICS, Vol. 30, 1995, No. 1, pp. 9-15.

² UNDP: Human Development Report 1990, New York 1990, p. 9.

³ UNDP, op. cit., p. 11.

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