PERFECTION OF SYSTEM OF CONTROLLED TRADE EMISSION BY THE CERTIFICATES WITHIN THE FRAMEWORK OF REALIZATION LONG RANGE TRANSBOUNDARY AIR POLLUTION

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1. In scientific works (*G. Klaassen, M. Amman, S. Kruitwagen etc.*), the condition of redistribution of emissions between sources (member-countries LRTAP), is submitted as system.

$$\begin{cases} \sum_{i=1}^{n}\sum_{j=1}^{m} P_{ij} = const; \\ \sum_{i=1}^{n}\sum_{j=1}^{m} C_{ij}(E_{ij}) \to \min; \\ P_{ij} > 0\ ;\ E_{ij} > 0\ . \end{cases} \qquad (1)$$

Where i – number of a source of emission; n – quantity of sources of emissions; j – kind polluter; m – quantity polluters; P_{ij} – emissions j polluter from i of a source; C_{ij} (E_{ij}) – specific expenses for suppression of emissions i polluter in i a source, as function from a degree of suppression of emissions E_{ij}.

At the same time, the analysis shows, that identical weight of emissions under varied conditions forms the various given loading on a complex of the recipients. The given loading it is offered to expect for a complex of the recipients under the formula:

$$G_{\Omega} = \sum_{k=1}^{N}\sum_{i=1}^{M} \sigma^{k} a_{i}^{k} D_{i}^{k} \qquad (2)$$

where k – index such as the recipients perceiving technogene loading; i – index of an impurity (kind of polluting substance); σ^{k} – factor determining the relative social importance of loadings on separate types of the recipients; a_{i}^{k} – parameter of relative social-ecological danger of pollution of an atmosphere by various impurity; D_{i}^{k} – size of a conditional annual doze i of an impurity received in territory Ω by the recipients k of a type.

The parameter of the given loading allows to take into account a number of the varied factors, which render essential influence on the ecology-economic characteristic of a source of emission: a type of territories perceiving technogene loading; structure and density of the recipients, stocky concentration of polluting substances and ets. System (1) as:

$$\begin{cases} G_{\Omega} = \sum_{k=1}^{n}\sum_{i=1}^{m} \sigma^{k} a_{i}^{k} D_{i}^{k} = const; \\ \sum_{i=1}^{N}\sum_{j=1}^{M} C_{ij}(E_{ij}) \to \min\ ; \end{cases} \qquad (3)$$

$G_\Omega > 0; E_{ij} > 0$

It is represented to more correct for realization of the mechanism of trade emissions by the certificates in frameworks LRTAP.

2. The efficiency of observance of ecological restrictions with the help emissions of the certificates will be defined by a set motivations of the factors, basic among which the minimization of expenses on achievement of target meaning of the given loading is.

Let's consider economic essence and contents motivations of the factors, leaning on logic of reasonings stated in works (*A. Endres, S.E., Atkinson* and *T.H. Tietenberg*).

$U(C_1(m_1))$ and $U(C_2(m_2))$ – limiting expenses C on reduction of additional unit of issue m for the first and second source, accordingly. Functional $U(C(m))$ displays the minimal limiting expenses on prevention of issue at a level of set of sources and is determined as horizontal summarize of functional $U(C_1(m_1))$ and $U(C_2(m_2))$.

The demand for the certificates is defined by their rate and limiting expenses for prevention of issue. At any rate of the certificates for a source it will be favourable to prevent issue so, that the limiting expenses were equal to a rate of the certificates. For rest emission of quantity the source will need the certificates. Thus for each source functional of limiting expenses for prevention of issue will coincide with a curve of demand on the certificates. The joint demand of both sources on emissions the certificates coincides with functional $U(C(m))$. If in the market the conditions of a complete competition work, the point of crossing of a curve supply and demand forms an equilibrium rate of the certificates k. At this rate the sources will ask in the market quantity of the certificates M_1B_1 and M_2B_2, accordingly. Other issue is prevented. Buying emissions the certificates, the first source receives the right on increase of issue at size $B_1 - A_1$ and moves on functional $U(C_1(m_1))$ from a point a_1 up to a point b_1, that results in decrease of limiting expenses from a level $C_1(a_1)$ up to a level k.

The second source on the contrary, selling эмиссионные the certificates takes up the obligation to reduce issue to size $A_2 - B_2$ and moves on функционалу $U(C_2(m_2))$ from a point a_2 up to a point b_2, that results in increase of limiting expenses from a level $C_2(a_2)$ up to a level k.

On it the theoretical calculations (*A. Endres, S.E. Atkinson* and *T.H. Tietenberg*) come to an end. At the same time, on our sight, they cannot be considered self-sufficient, and conclusions received on their basis, authentic. The important economic characteristic of sources of emissions – levels of the incomes and their influence on the limiting price emissions of the certificates here is missed from a kind. The price of quality of atmospheric air depends on a level of the income of the economic subject. If the given statement to recognize

fair, economic essence motivations of the factors and, that most important, possible price emissions of the certificates essentially will change. Functional $UD_1(m_1)$ and $UD_2(m_2)$ also reflect dependences of a level of the income on quality of an environment. Then for the first source the inequality $C_1(a_1) > k(B_1 - A_1) + C_1(b_1)$ is obligatory, but not by a sufficient condition of efficiency of sale and purchase emissions of the certificates. In view of decrease of the income at increase of issue from a level A_1 up to B_1, a sufficient condition of efficiency of the bargain is the inequality

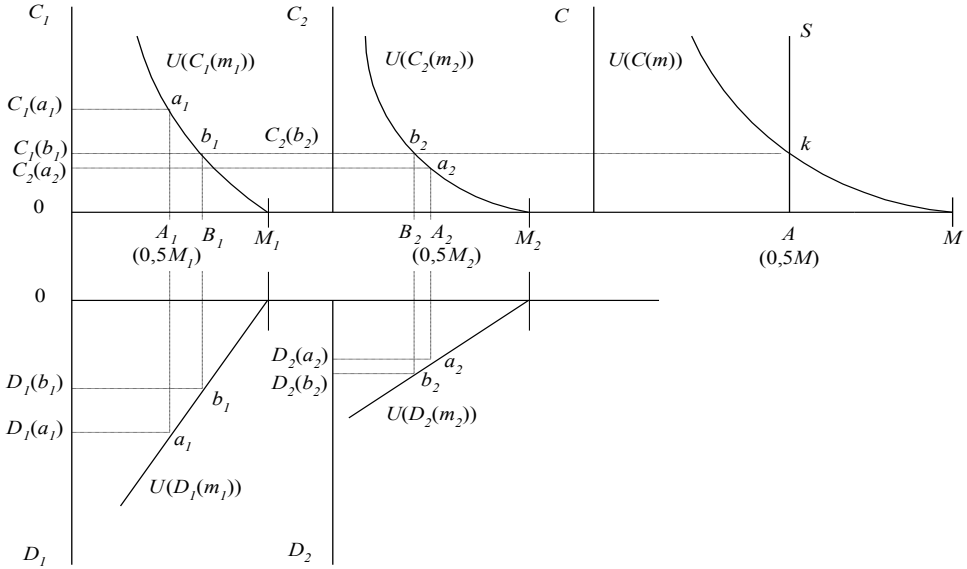

Fig. 1. Theoretical model of trade emission by the certificates in view of a level of the incomes.

$$C_1(a_1) > k(B_1 - A_1) + C_1(b_1) + [D_1(a_1) - D_1(b_1)]. \quad (4)$$

On the contrary, second source, the seller of the certificates, receives as a result of the bargain more than difference $[C_2(a_2) + k(B_1 - A_1)] - C_2(b_2)$ on size $D_2(b_2) - D_2(a_2)$. Hence, for the second source an obligatory and sufficient condition of efficiency of the bargain is the inequality

$$C_2(b_2) - k(B_1 - A_1) + [D_2(b_2) - D_2(a_2)] > C_2(a_2). \quad (5)$$

As follows from (4), the decrease of the income at the buyer emissions of the certificates narrows a range of efficiency of the bargain. At the seller, as it

follows from (5), the increase of the income expands this range. Thus, the change of a level of the incomes can significally affect representation about the limiting price emissions of the certificates. For conditions represented in a fig. 1, at $C_1(a_1) = k(B_1 - A_1) + C_1(b_1)$ and $C_2(a_2) = C_2(b_2) - k(B_1 - A_1)$ the bargain theoretically can be held, as she, on the first sight, corresponds isobeneficial of variants of issue. Actually seller emissions of the certificates will have the income equal $D_2(b_2) - D_2(a_2)$, and buyer – losses $D_1(a_1) - D_1(b_1)$.

However and such condition is not settling in the bilateral bargain. Except for absolute change of the income, both at the buyer, and at the seller of the certificates, on our sight, it is necessary to take into account parameters of the attitude of absolute meaning of expenses on suppression of emissions to absolute meaning of the incomes. Can appear, that at relative equality of expenses $C_1(b_1) = C_2(b_2)$, the attitude to absolute meaning of the income valid $D_1(b_1) > D_2(b_2)$ at the seller of the certificates will be more

$$\frac{C_2(b_2)}{D_2(b_2)} > \frac{C_1(b_1)}{D_1(b_1)}. \qquad (6)$$

It means, that the buyer of the certificates theoretically can accept a condition, at which $C_1(a_1) = k(B_1 - A_1) + C_1(b_1)$. We considered conditions, when $D_1(b_1) > D_2(b_2)$. Conditions, when practically are possible $D_1(b_1) \le D_2(b_2)$. However, it does not influence theoretical conclusions, but only strengthens the thesis about necessity of the account of the incomes and their influence on conditions of efficiency of the purchase – sale emissions of the certificates.

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