Distributed Model Application to the Greenhouse Gas Inventory in the Energy Sector of Ukraine

Lubomyra Kujii and Bohdan Oleksiv

The information technology for the distributed model of the greenhouse gas inventory is developed.

1. The Problems of the Greenhouse Gas Inventory

During Greenhouse Gas (GHG) inventory the reliability of the input data and appropriate methods of their processing are very important. The input information includes the statistical data of the energy sector of the economy and data from the other branches of the economy such as agricultural and forestry branches.

The regional inventory demands application of the new methods of the calculation and results of mapping. The fossil fuel statistics for the different regions of Ukraine and proposed new information technology could be the effective instruments for the estimation of the GHG emission of the energy sector of the economy.

2. The Using of the IPCC Approach

IPCC Guidelines for National GHG Inventory (Revised 1997) are the universal instruments and therefore their complex quantitative indicators do not entirely take into account the regional features of the economy structure, fuel type, methods and technology of their combustion, plans and regulations of the fuel use etc.

The latter permits to conclude that IPCC methods are the part of the information technology that was worked out in (Bun/Gusty/Dachuk/Oleksiv/Tsybrivskyy 2003). Such technology allows to realise GHG inventory for the three levels (state, regional and elementary parts).

3. The Distributed Approach of the GHG Inventory

For the distributed GHG inventory basing of the IPCC guidelines it is necessary to fill in input data into Excel-tables repeatedly. In our technology the input data are

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2 State Scientific and Research Institute of Information Infrastructure, POB 5446, Lviv-31, 79031, Ukraine
email: lkujii@dndiii.lviv.ua, oleksiv@mail.lviv.ua
gathered from the Access database GHGInvNNNN.mdb (Bun/Gusty/Dachuk/ Oleksiv/Tsybrivskyy 2003). For each year of inventory is created the separate data base, for example: for the year 2002 the data base is GHGInv2002.mdb; for the year 2003 the data base is GHGInv2003.mdb.

The emission of the Greenhouse Gas for the energy sectors of the economy in case of the fuel combustion is reviewed (Stolyarchuk/Kujii 2003).

4. Results

Elaborated information technology has been used for calculation of greenhouse gas emissions by oblast-distributed model of inventory of greenhouse gases and IPCC methodology (Energy sector). Statistical books provide initial data for activities in the sector for 2000. Figure 1 represents the resulting packet for one cell (with code 01200415) of the model.

It is obvious from the table 8 that, using this information technology one can create 60 layers of the digital map for given model. Figures 2 represent 3 created layers as example.

5. Conclusion

The proposed distributed approach for the Greenhouse Gas inventory in the state power engineering could have the significant effect on the estimation of national emission. Regional model is important because of the possibility of consideration of the regional features and differences between different ecosystems, different technologies and different methods of the fuel mining and processing.

The Software that was developed for the distributed Greenhouse Gas inventory can be used for the quantititative estimation of the GHG emission from the different sectors of the economy in the different state regions. It can be used for the monitoring, planning and decreasing of the GHG emission.
Figure 1.
The resulting packet for one cell (with code 01200415) of the model.

Figure 2.
Total Energy (layer L010CO2); Fuel Combustion Activities (Sectoral Approach) Energy Industries (Layer L01AA1CO2); Fuel Combustion Activities (Sectoral Approach) Other Sectors … (Layer L01AA4A4cCO2)

Our approach will give such opportunities:

1. Detection of the most dirty region of the country.
2. Heighten of effectiveness of using of all fuel types and technology of their incineration.
3. Planning of actions directed on GHG emission decrease.
4. Analysis of key aspects of the influence of the different features of the regions on the GHG balance of Ukraine.

This elaboration is the same step forward directed on the solution of the problem of the carbon decreasing in the environment.
Bibliography

