

The Approach to the Energy Balance

For many of the project partners, this was the first Energy Balance to be undertaken by the agency. There was no standard approach and no training given. Therefore, a few different approaches resulted out of the group of 7 partners.

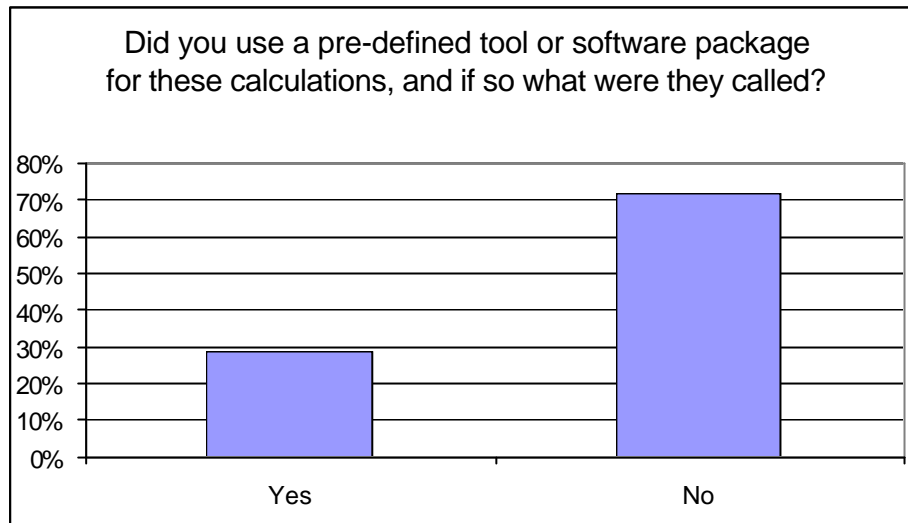
A survey was sent out to all partners of the MOVE project. Data was collected, analysed and presented to all the partners at the final project meeting. The results were discussed and are described in the following sections.

- ? Method of Data Calculation
- ? Indicators and Assumptions
- ? Problems with Data Collection
- ? Improvements to the Energy Balance Approach

Method of Data Calculation

As mentioned above, there were several different approaches used when calculating the Energy Balance for the area served by the Energy Agency. All of the partners adopted a Top Down approach to calculating the Energy Balance of their area. When converting the energy results to carbon dioxide emission figures, 2 partners utilised a pre-defined software package to do these calculations.

Figure 1 The Use of a Pre-defined Tool in calculating the resulting CO₂



The various approaches to calculating the Energy and Emissions Balance:

- ? Top Down Approach
- ? Top Down Approach and Software Package, EMEP Corinair
- ? Top Down Approach and Software Package, IPCC-96

These approaches are described in each of the following sections.

Top Down Approach

The top down approach involved taking data at a national level i.e. from census data etc. and with conversion factors, converting it down to the local area level. The data was generally sourced from National reports and conversion factors were based on population comparisons, number of vehicle comparisons etc. The data that was collected was the total energy consumption by fuel and by sector. Therefore using the national conversion factors for each fuel enabled the CO₂ to be calculated for each sector.

Use of the Software Package EMEP Corinair

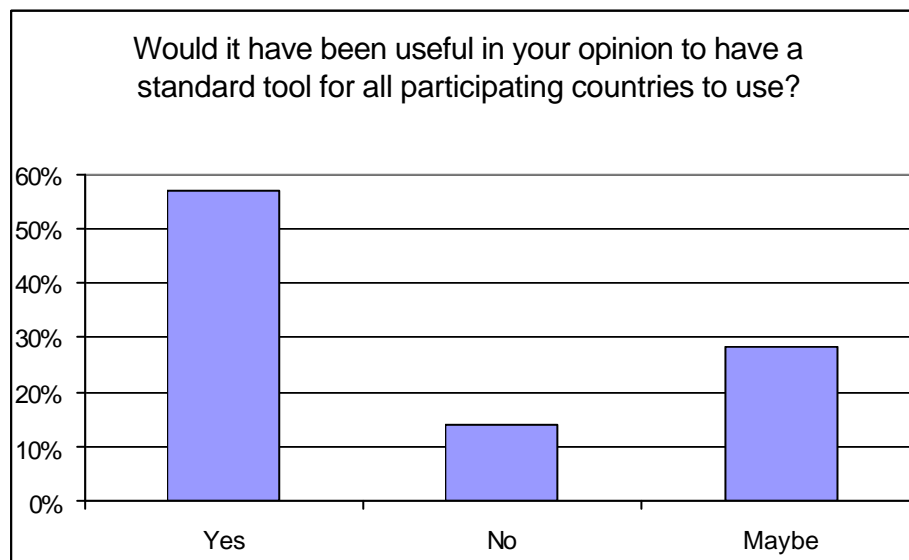
This software package is an “Emissions Inventory Guidebook” – programme COPERT III. It was established especially for road transport. Slovakia used a combination of the Top Down Approach and this Software Package to develop their energy balance. They

were able to collect some of their data directly from the electricity and heat producers, important companies as well as from the transport providers in the town (e.g. the electricity supply by sector, natural gas supply by sector, fuel consumption in city transport....etc.). This data served mainly as a control and comparison with the figures obtained through proportion of national figures.

Use of Software Package, IPCC-96

Unlike the rest of the partners, the Spanish partner based in Bilbao could access regional data without using any conversion factors. They then inputted this data into a software package IPCC-96. The data for energy consumption for road transportation (diesel and gasoline) was obtained from the Industry Ministry. For air transport the data was obtained from the airports and from the main kerosene distribution company in Bilbao. Electricity use for railway transport was obtained from the Electrical Utility. For ports the data was obtained from the Port of Bilbao and estimated for other ports.

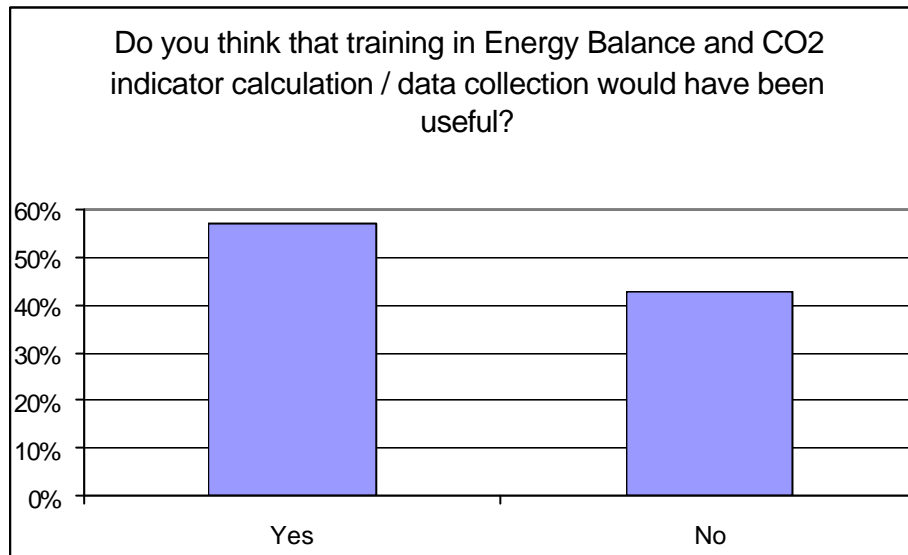
Figure 2: The Usefulness of a Standard Tool and Approach



As can be seen in Figure 3, 43% of the partners' felt that training should have been provided to for calculating the Energy Balance. Therefore, in the future, a standard

approach using the same tool with training should be provided if the completion of an Energy Balance is required by partners of a group project.

Figure 3 The Need for Additional Training



Indicators and Assumptions

The total list of indicators that were calculated is listed below.

- kWh Total Fuel Energy Consumption by fuel
- kWh Total Fuel Energy Consumption by sector
- CO₂ by fuel
- CO₂ by sector
- kWh per person
- CO₂ per person
- CO₂ Tonnes per year
- CO₂ Tonnes per km
- kWh per transport type
- Energy Intensity (Energy Consumed per unit GDP)

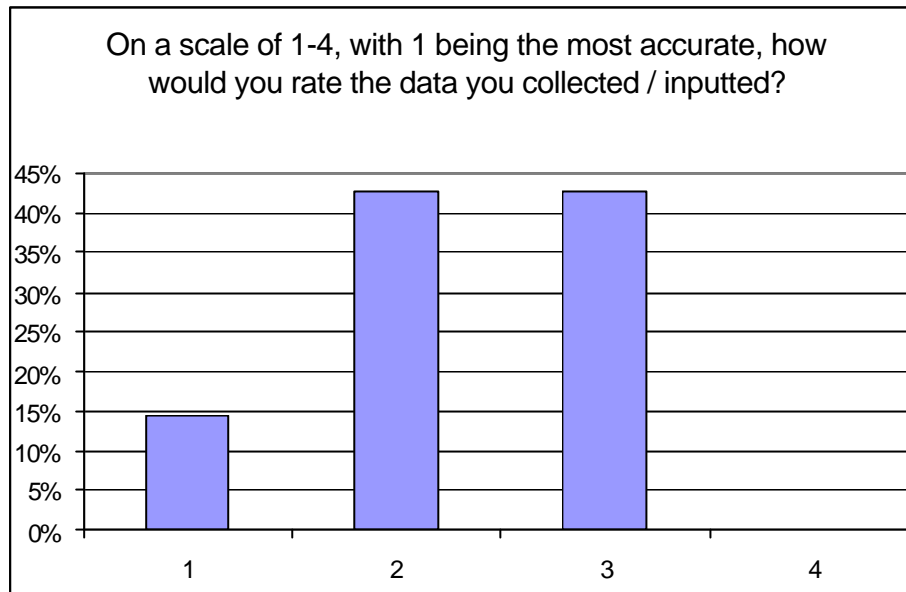
As can be seen, there are 10 different indicators here. The majority of the partner countries calculated the first 6 indicators but then other countries did not use these indicators 6 indicators at all.

Assumptions were made when calculating the energy balance of the areas. Because the Top Down approach required figures from a National level to a Local level, there were assumptions made on the required conversion factors themselves. For example, in one case it was assumed that road transport was the main source of fuel usage and emission generation at a local level. In another case, it was assumed that all of the fuel sold within the area boundary was used within this boundary. For detailed transport analysis, assumptions had to be made to use the average fuel consumption / km, the average age of circulating cars, in order to calculate the CO₂ emissions from the private cars in the area.

The assumptions that were made did have an impact on the accuracy of the data in the Energy Balance. This can be seen in Figure 4, 86% of the partners involved in the MOVE project declared that their data was the best that they could achieve under the circumstances but in terms of accuracy was only middle of the range.

There was one country, Spain, that did not need to use the Top Down Approach because they did not need to make any assumptions in their Energy Balance calculation. The reason for this is that the region of Bilbao has its own Utilities and Transport Ministry. Therefore, this partner could use regional data directly.

Figure 4: The Accuracy of the Data in the Energy Balance



This is obviously the ideal situation that all the partners in the MOVE project would like to aspire to. However, in most countries this data at a local level is not readily available because of data protection and privacy issues with the private utility companies. All partners experienced problems when collecting the data. These are outlined in the next section.

Problems when Collecting Data

All of the partners in the MOVE project experienced problems when collecting the general data required as the Energy and Emissions Balance inputs.

The problems that were encountered are listed below:

1. The regional/local data available to convert National data to Local level was not always available
2. Accurate local data from energy suppliers was not available due to confidentiality issues
3. Statistics were not always reliable and the method of collecting national statistics changed over time so it is difficult to compare energy balances over the years.

4. In some cases, data was too old to obtain an accurate evaluation.
5. In some cases, certain figures such as the balance of biofuels was not well established at a regional level.

These problems were overcome by making assumptions with conversion factors, boundary setting etc. as was described earlier.

Improvements to the Energy Balance Approach

An Energy and Emissions Balance created anywhere is only as accurate as the data that is collected and inputted into the calculation. Good data is the salient feature of its success.

Improvements to the data should include:

1. accurate number of vehicles
2. energy efficiency of different kinds of fuels
3. fuel consumption per person
4. age band of the vehicles
5. the fuel mix for private and commercial transport at a National level
6. the relative efficiency of part-load or fully loaded vehicle
7. number of people using sustainable modes
8. number of car-sharing organisations

As stated earlier in the section on data collection, to ensure the highest accuracy with regards to data collection, the less assumptions that are made the better. So taking National figures and converting these down to regional and local figures is not the most accurate approach. Having regional data without making assumptions will give the most accurate results. Therefore it is recommended that regional and local data collection should be done by conducting research and direct surveys to homeowners in the area on their energy consumption patterns.

For group projects a standard approach with a pre-defined tool is advised with a minimal amount of indicators as outputs. This would enable benchmarking of the Energy Balances among the partners and learnings to be shared between the partners.