

Greenhouse gas emission inventory

- *UN Framework Convention on Climate Change (article 4)*
- *«Flexibility mechanisms» of Kyoto Protocol*



Methodological support

- IPCC revised guidelines of national inventory of greenhouse gas emission, 2001
(«Guiding principles»)
- IPCC – Intergovernmental Panel on Climate Change

Levels of greenhouse gas emission evaluation

1st level – *balance settlement of the country*

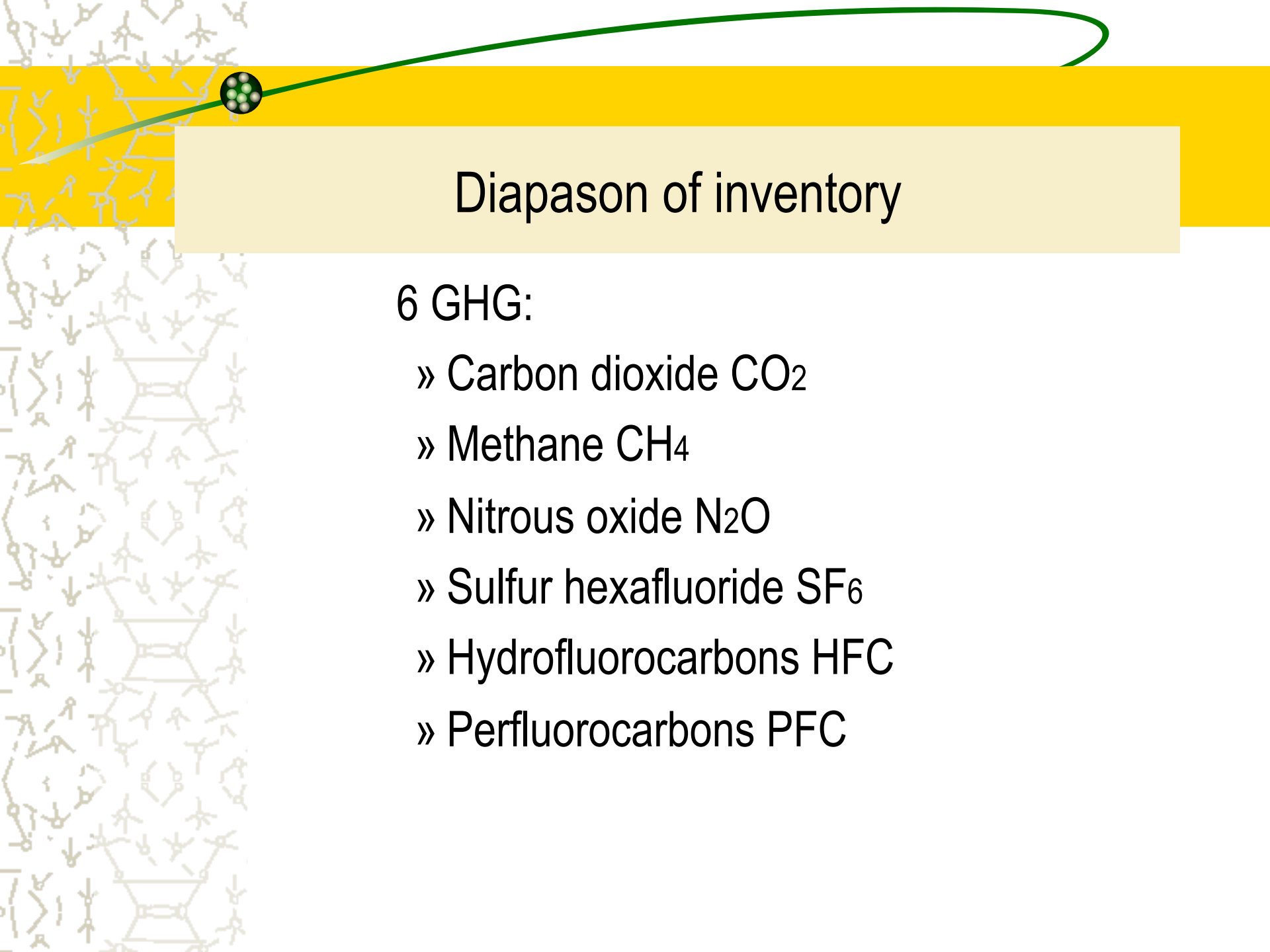
2nd level – *emission evaluation by categories of sources*

3rd level – *evaluation of emissions of concrete technological processes and enterprises*



Requirements for inventory

- ✿ **Transparency** – presence of clear explanations of accepted allowances and methodologies
- ✿ **Conformity** – use of coordinated data and methodologies for a basic year and all the following years
- ✿ **Comparability** – use of methodologies recommended by IPCC, factors of emission and results of national researches and data
- ✿ **Fullness** – inventory comprises all the available data by the sources
- ✿ **Exactness** – assessment of uncertainties and reliance of presented data



Diapason of inventory

6 GHG:

- » Carbon dioxide CO_2
- » Methane CH_4
- » Nitrous oxide N_2O
- » Sulfur hexafluoride SF_6
- » Hydrofluorocarbons HFC
- » Perfluorocarbons PFC



Diapason of inventory

«Guiding principles» precepts to present data on GHG emission by the next main sectors:

- ✿ Energetics
- ✿ Industrial processes
- ✿ Use of dissolvents
- ✿ Agriculture
- ✿ Change of land use and forestry
- ✿ Waste



Energetics

- Energetics includes both productions directly connected with fuel combustion and secondary productions not connected with fuel combustion



Diapason of inventory for “Energetics”

- » Carbon dioxide CO_2
- » Methane CH_4
- » Nitrous oxide N_2O
- » Sulfur hexafluoride SF_6



Background information

Real volumes of different fuel types consumption:

- forms of state statistical reporting on fuel consumption
- reports containing summary tables showing displacement and consumption of resource for the whole of the company and separate enterprises with account for subsidiary enterprises and organizations held in their inventory.

Emission accounting is formed according to the schedule:

EMISSION

=

**Data on
fired fuel amount**

X

Scaling factors

EFT – equivalent fuel ton - a unit for comparison of thermal value of different fuel types

1 kg EFT = 7000 kcal

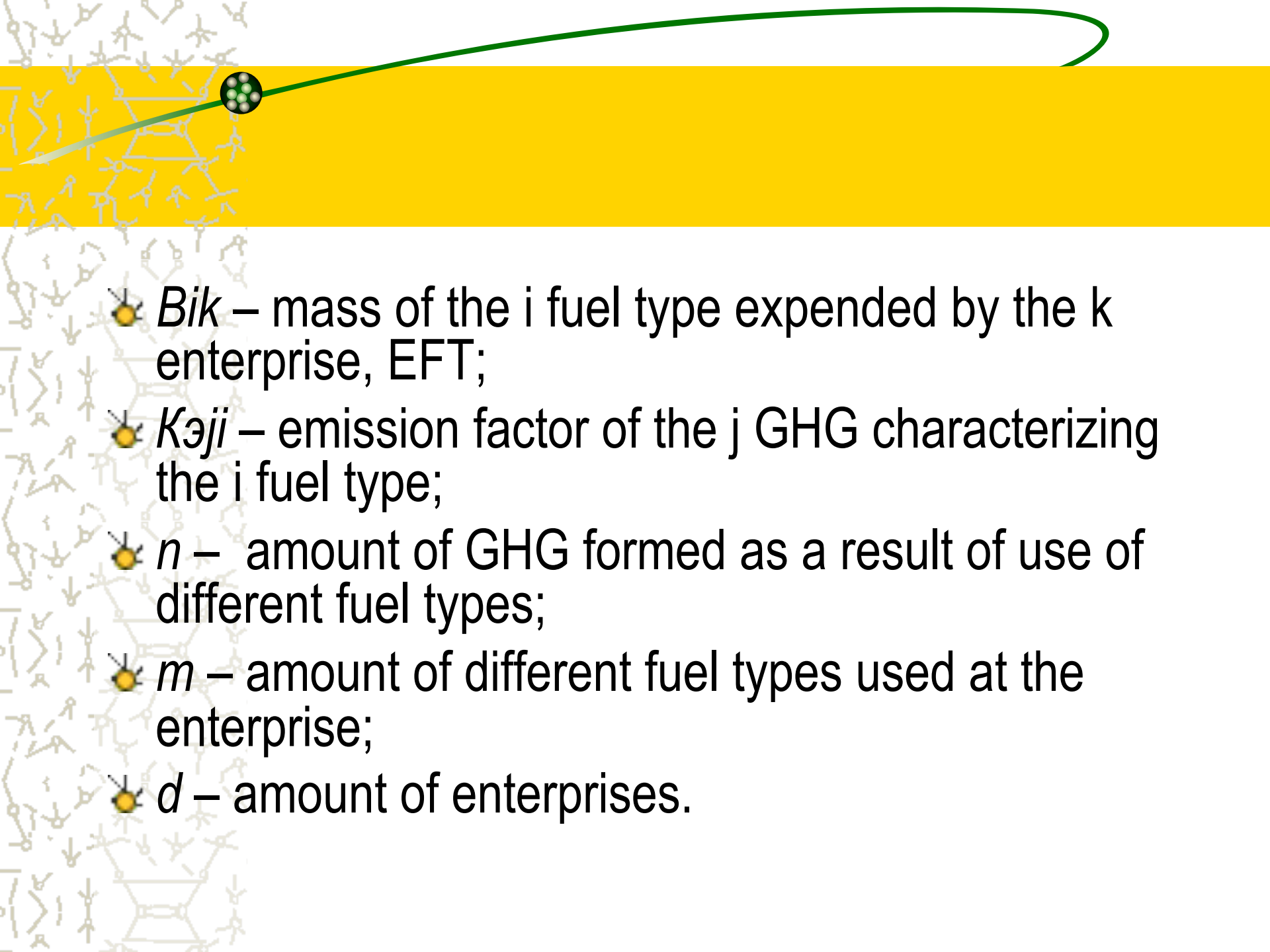


Methodology of GHG emission calculation

$$M_{ghg} = \sum_{k=1}^d \sum_{j=1}^n \sum_{i=1}^m N_j \cdot B_{ik} \cdot K_{\varepsilon ji}$$

где M_{ghg} – GHG emission in CO₂-eq with the use of different fuel types, th. tonnes CO₂-eq;

N_j – scaling factor of GHG emission in CO₂-eq depending on potential of the global warming of the j GHG;

- 
- ✿ B_{ik} – mass of the i fuel type expended by the k enterprise, EFT;
 - ✿ $K_{\alpha ji}$ – emission factor of the j GHG characterizing the i fuel type;
 - ✿ n – amount of GHG formed as a result of use of different fuel types;
 - ✿ m – amount of different fuel types used at the enterprise;
 - ✿ d – amount of enterprises.

Scaling factors of GHG emission in CO₂-eq. (*N_j*)

• Methane - 21

• Nitrous oxide - 310

• Sulfur hexafluoride - 23900

IPCC emission factors (*Кэји*)

Type of fuel	t CO ₂ /eq	t C /TJ
Solid	2,78	25,8
Gas	1,65	15,3
Liquid	2,27	21,1

IPCC emission factors (*Кэји*)

Type of fuel	Methane, kg/TJ	Nitrous oxide, kg/TJ
Solid	1,0	1,4
Gas	1,0	0,1
Liquid	3,0	0,6