**CGE Greenhouse Gas Inventory Workshop**

Name: .

**Energy Sector – Fuel Combustion**

1. Which gases are generally included in the energy sector under the UNFCCC reporting framework and Revised 1996 IPCC Guidelines?
   1. Only CO2
   2. CO2, CH4, N2O, CO, NOx and NMVOCs; optionally, SO2
   3. CO2, CH4, N2O, CO, NOx, NMVOCs, HFCs, PFCs and SF6
   4. None of the above
2. Aggregation of emissions in terms of CO2-equivalent should be performed using a 20-year integration period.
   1. True
   2. False
3. What is (are) the most important factor(s) that determine(s) the amount of CO2 emissions from the combustion of fuels?
   1. Carbon content of the fuel
   2. Combustion characteristics such as technology type, size and vintage of the combustion technology, and maintenance
   3. Pollution control equipment
   4. None of the above
4. What is (are) the most important factor(s) that determine(s) the amount of CH4 and N2O emissions from the combustion of fuels?
   1. Carbon content of the fuel
   2. Combustion characteristics such as technology type, size and vintage of the combustion technology, and maintenance
   3. Pollution control equipment
   4. Both a and c
   5. Both b and c
   6. All of the above
5. For the purpose of estimating fuel combustion emissions, “apparent consumption” of fuels is based on data from petroleum refineries on their sales of petroleum products.
   1. True
   2. False
6. When using the Reference Approach, a negative result when calculating the “apparent consumption” for any category of fuel should be considered as a case of miscalculation or inconsistency in your fuel consumption estimates.
   1. True
   2. False
7. Should Parties use both Reference Approach and Sectoral approach for determining CO2 and non-CO2 emissions?
   1. Yes
   2. No, both the Reference Approach and Sectoral Approach should be applied for determining CO2 emissions. For non-CO2 estimates, only the Sectoral Approach is relevant.
   3. None of the above
8. In case of discrepancies between the Reference Approach and Sectoral Approach, should the emission estimates from the Reference Approach be used as your official emission estimate for submission to the UNFCCC?
   1. No
   2. Discrepancies between the Reference Approach and Sectoral Approach are not acceptable
   3. Yes
9. Emissions due to international bunker fuels…
   1. Should not be calculated since they cannot be precisely allocated to a particular Party
   2. Should be calculated and added to the national emission estimates
   3. Should be calculated but should not be added to the national emission estimates. They should be calculated and reported separately
   4. None of the above
10. Emissions from electricity self-production (i.e. autoproduction) by a steel production facility should be allocated to the Public Electricity and Heat Production category.
    1. True
    2. False
11. The same calorific values should be used by all Parties and across approaches (i.e. Reference and Sectoral).
    1. True
    2. False
12. Which emissions due to the combustion of biofuels for energy should be allocated to Land Use, Land-use Change and Forestry (LULUCF)?
    1. None
    2. All emissions
    3. Only CO2 emissions
    4. Only non-CO2 emissions
13. Excluding the LULUCF sector, which of the following statements is most accurate?
    1. Combustion of fossil fuels is the largest source of CO2 emissions from most Latin America and Caribbean (LAC) countries, accounting for roughly 50% of CO2 emissions
    2. Combustion of fossil fuels is the largest source of CO2 emissions from LAC countries, accounting for roughly 90 percent of CO2 emissions
    3. Combustion of fossil fuels is a minor source of CO2 emissions from LAC countries
14. CO2 emissions from fossil fuel consumption within the forestry industry should be reported under….
    1. The energy sector
    2. The industrial processes sector
    3. The LULUCF sector
    4. None of the above
15. How should the emissions from the combustion of municipal solid wastes by waste incinerators/combustors that recover some useful thermal energy be reported?
16. All non-CO2 emissions and CO2 from fossil based carbon should be reported under the energy sector.
17. All non-CO2 emissions and CO2 from fossil based carbon should be reported under the waste sector.
18. CO2 emissions from biogenic based carbon are accounted for under the LULUCF sector
19. CO2 emissions from fossil-based carbon should be reported under the energy sector and CO2 emissions from biogenic based carbon under the waste sector
    1. Both II and III
    2. Both I and IV
    3. Both I and III
    4. Both II and IV
    5. None of the above

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1. Answer: (b). The Revised 1996 IPCC Guidelines include methodologies for estimating seven gases resulting from the combustion of fuels along with fugitive methane and CO2 emissions from fossil fuel production, processing, transport and storage.
2. Answer: (b). Parties should report aggregate emissions and removals of greenhouse gases using GWPs based on a 100-year time horizon for integrating emission impacts on the atmosphere.
3. Answer: (a). Carbon dioxide (CO2) emissions result from the release of the carbon in fuels during and after combustion, in which most carbon is emitted as CO2 immediately. Thus, CO2 emissions for fossil fuel combustion primarily depend upon the carbon content of the fuel.
4. Answer: (e). CH4 and N2O are generated in small quantities from fuel combustion due to incomplete combustion. The production of these gases is dependent on the combustion characteristics such as the temperature in the boiler/stove, technology type, size and vintage of the technology, and maintenance conditions. Pollution control equipment can also dramatically affect the amount of pollutants that actually enter the atmosphere.
5. Answer: (b). Apparent consumption of fuels is the foundation for the Reference Approach calculations. To calculate apparent consumption, there is a need for a balance measure of primary fuels produced, plus imports, minus exports, minus international bunkers and minus net changes in stocks of both primary and secondary fuels. In this way, carbon is seen to be brought into the country from energy production and imports (adjusted for stock changes) and moved out of the country through exports and international bunkers. Refinery sales or end user consumption data is generally used as the basis of estimates for the Sectoral Approach, which is to be based on actual consumption of primary and secondary fuels.
6. Answer: (b). Apparent consumption of secondary fuels can result in negative numbers. This simply indicates a net export and/or stock increase in the country for a particular secondary fuel.
7. Answer: (b). The Reference Approach is only applicable to estimating CO2 emissions. It is primarily dependent on the carbon content of fuels. Emission processes of non-CO2 gases are dependent to a far greater degree on combustion circumstances, which preclude the use of national aggregate emission factors by fuel type.
8. Answer: (a). In most cases the Reference Approach calculations lead to divergent results from the Sectoral Approach calculations. There are many logical reasons for such discrepancies, such as the use in the Reference Approach of a single calorific value and carbon content factor for apparent consumption of crude oil, while a set of calorific values and carbon content factors are used for the different secondary fuels used when undertaking Sectoral Approach calculations. Differences between the two approaches should be explained in a Party’s inventory submission.
9. Answer: (c). CO2 emissions arising from fuel use in ships or aircraft for international transport should not be included in the national totals. But they should be calculated and reported separately as a memo item.
10. Answer: (b). Autoproduction of electricity occurs when an industrial facility generates electricity for its own use. According to the Revised 1996 IPCC Guidelines, emissions due to electricity autoproduction should be accounted in the corresponding consuming source subcategory or sector. In earlier stages of the inventory methodological developments, the electricity autoproduced was to be counted under Public Electricity and Heat Production. However, due to difficulties and uncertainties in splitting the fuels used between usual combustion activities for thermal energy at industrial facilities and electricity autoproduction at those facilities, it was decided that emissions from electricity autoproduction should be reported under the industry category where it occurs.
11. Answer: (b). Parties should use their own net calorific values (NCV) of fuels. Where unavailable, IPCC default NCVs may be applied. If a given fuel product is imported from various sources, with different chemical properties that affect its thermal characteristics, Parties should use a weighed average calorific value based on NCVs provided by the fuel suppliers. The categorization of fuels for the Sectoral and Reference approaches may also require distinct calorific values to be used.
12. Answer: (c). Theoretically, the release of carbon due to biomass used as energy is accounted for under the LULUCF sector. It is generally accounted for within the balancing of biogenic carbon stocks and fluxes, and not in the energy sector because of the likelihood of double counting. Non-CO2 emissions are not subject to the same double-counting issues as carbon and are reported in the energy sector like fossil fuels.
13. Answer: (b). Total CO2 emissions from most LAC countries are mainly due to combustion of fossil fuels. According to greenhouse gas inventories submitted to the UNFCCC, combustion of fossil fuels accounts for about 90% of the total CO2 emission from LAC countries.
14. Answer: (a). Emissions from the combustion of all fossil fuels for energy should be reported under the energy sector. Fossil fuel combustion emissions by the forest products industry should be reported under subcategory 1.A.4.c (Agriculture/Forestry/Fisheries).
15. Answer: (c). When waste is incinerated without any energy recovery, emissions should be reported under the waste sector. When energy is recovered at waste combustion facilities, emissions should be reported under the energy sector.In this case, the total non-CO2 emissions from the combustion of both the fossil and biogenic based waste materials should be considered. Only CO2 emissions resulting from the incineration of fossil based carbon in waste (e.g. plastics, synthetic textiles, synthetic rubber and waste oil) should be considered in the calculations. Thus, CO2 from combustion of any biogenic-based carbon (e.g. paper, food wastes, and wooden materials) should not be considered, as the effect on biogenic carbon stocks is assumed to be captured within the LULUCF sector estimates.