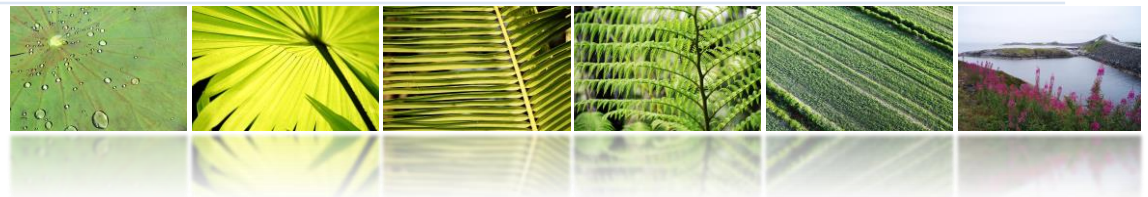




United Nations  
Statistics Division

# Exercise - Cane products



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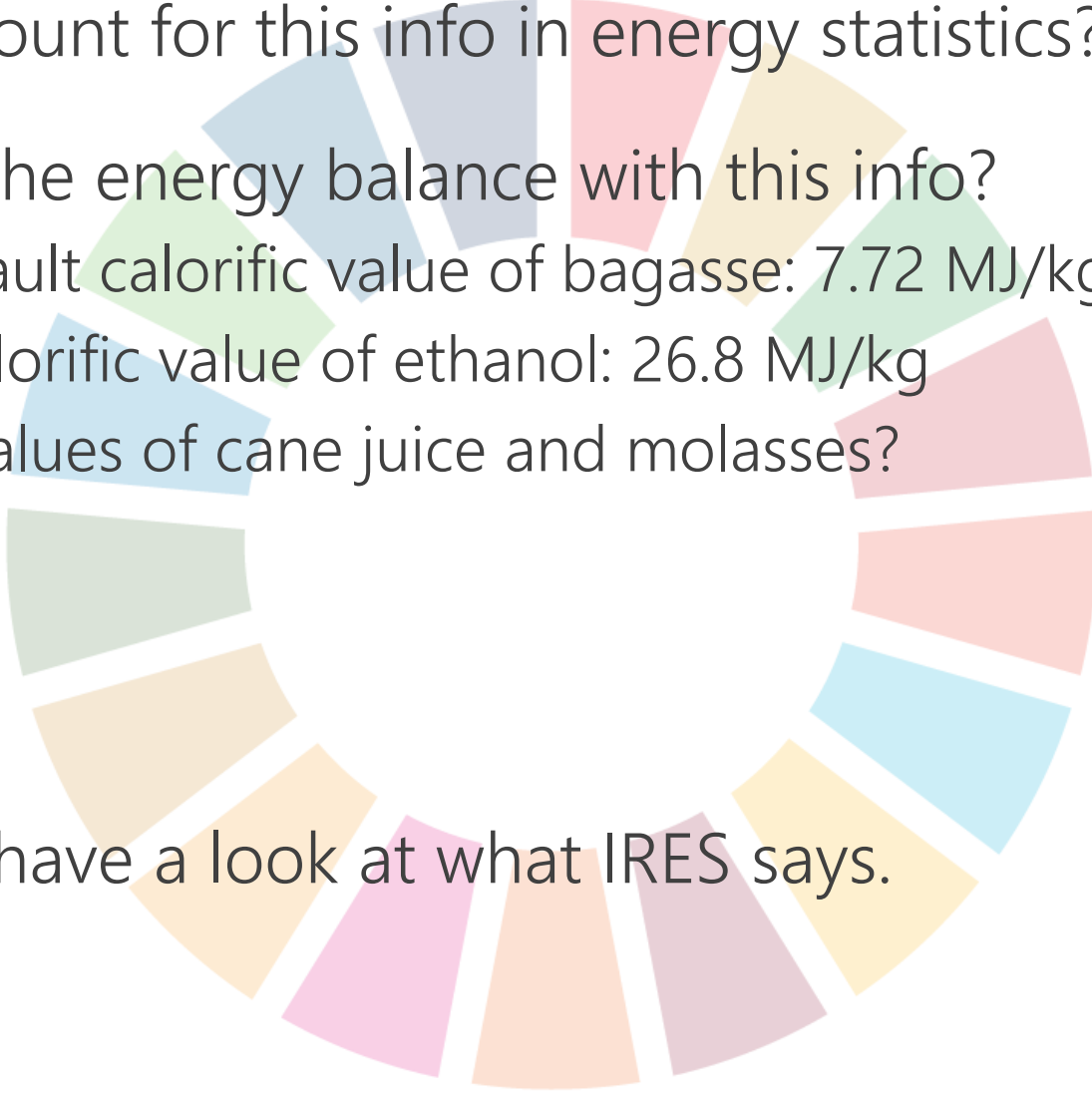
Lima, Peru, 12 November 2019  
Workshop on energy statistics for the LA and the C regions

# Biomass - cane products

- In a certain year, 2500 kt of bagasse was produced, and used as follows:
  - 100 kt exported to neighboring countries
  - 500 kt used as fertilizer by crop growers
  - 1000 kt burned as fuel by sugar mills
  - 900 kt burned to generate 385 GWh of electricity and 100TJ of heat (the latter is used in the sugar production)
- 20 kt of molasses and 85 kt of cane juice were used as input to produce 12 kt of ethanol.
  - 0.1 GWh of electricity consumed in the process
- Of the 12 kt of ethanol produced, 2 kt were distributed to be used as cleaning products, and 10 kt blended with gasoline.

# Biomass - cane products

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- How to account for this info in energy statistics?
  - How to fill the energy balance with this info?
    - Note: Default calorific value of bagasse: 7.72 MJ/kg
    - Default calorific value of ethanol: 26.8 MJ/kg
    - Calorific values of cane juice and molasses?
  - First, let us have a look at what IRES says.
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## 4 Reference – Biomass

*2.11 Boundary of energy products.* The description of the boundary of the universe of energy products is not always straightforward.

- For example, *corncoobs* can be:
  - (1) combusted directly to produce heat;
  - (2) used in the production of ethanol as a biofuel,
  - (3) consumed as food, or
  - (4) thrown away as waste.
- According to the scope of SIEC, corncoobs, as such, are considered energy products for the purpose of energy statistics only in case (1) above, that is when they are combusted directly to produce heat (c.f. paragraph 3.10).
- In all other cases, they either do not fall within the boundary of energy statistics (when used as a source of food), or they enter the boundary of energy statistics as a different product (e.g. ethanol).

# Reference – Electricity and Heat

5.45. Statistics on electricity and heat (SIEC section 7 (Electricity) and section 8 (Heat)) are collected according to the type of producer and type of generating plant. Two types of producers are distinguished:

- *Main activity producers*. These are units that produce electricity or heat as their principal activity. Formerly known as public utilities, these enterprises may be privately or publicly owned companies.
- *Autoproducers (electricity)*. These are units that produce electricity, but for which the production is not their principal activity.
- *Autoproducers (heat)*. These are units that produce heat for sale, but for which the production is not their principal activity. Deliveries of fuels for heat generated by a unit for its own purposes are classified as final consumption, and not as transformation inputs.

# Reference – Electricity and Heat (2)

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5.47 Three types of generating plants are also distinguished:

- *Electricity plants* refer to plants producing only electricity. The electricity may be obtained directly from natural sources such as hydro, geothermal, wind, tidal, marine, solar energy or from fuel cells, or from the heat obtained from the combustion of fuels or nuclear reactions.
- *CHP plants* refer to plants that produce both heat and electricity from at least one generating unit in the plant. They are sometimes referred to as “co-generation” plants.
- *Heat plants* refer to plants (including heat pumps and electric boilers) designed to produce heat only for deliveries to third parties. Deliveries of fuels for heat generated by an autoproducer for its own purposes are classified as final consumption.

# How to account for this info in energy statistics?

## BAGASSE

- 100 kt of bagasse exported to neighboring countries
  - Was it for energy or non-energy purposes?
- 500 kt were used as fertilizer by crop growers
  - Clearly not for energy purposes (out of scope)
- 1000 kt burned as fuel by sugar companies
  - Primary production of solid biomass (bagasse)
  - Final energy consumption by food and tobacco industry
- 900 kt burned to generate 385 GWh of electricity and 100TJ of heat (the latter is used in the sugar production)
  - Input to autoproducer CHP plants

# How to account for this info in energy statistics?

## ELECTRICITY and HEAT

- Output from autoproducer CHP plants:
  - 385 GWh of electricity (included – Production of electricity from renewable combustible fuels)
  - 100 TJ of heat (excluded as this heat is not sold, but used in the process of producing sugar)
- 0.1 GWh of electricity consumed in the process of producing ethanol: energy industries own use, as this energy was used to support production of an energy product (bioethanol), but was not transformed in this product.\*



# How to account for this info in energy statistics?

## Other cane products

- 20 kt of molasses and 85 kt of cane juice were used as input to produce 12 kt of ethanol.
  - Molasses and cane juice are out of the scope of energy statistics (c.f., corncob case (2))
- 12 kt of ethanol produced, but only 10 kt were used for energy purposes (2 kt for non-energy are excluded)
  - Primary production of 10 kt of ethanol (biogasoline).
  - Consumption in transport (no matter who is using it and for what purposes). Most likely in road transport.
  - Alternatively, it can be accounted for as transfers to gasoline, but the bioethanol content has to be clearly identifiable.

# Leaving out what is outside the scope

- 10 kt of bioethanol for energy purposes
  - Primary production of biogasoline
  - Final Energy Consumption in road transport
  - $10 \text{ kt} \times 26.8 \text{ MJ/kg} = 268 \text{ TJ}$
- 0.1 GWh of electricity consumed in production process
  - Energy industries own use
  - $0.1 \text{ GWh} \times 3.6 \text{ TJ/GWh} = 0.36 \text{ TJ}$
- 1000 kt bagasse burned directly as fuel by sugar mills
  - Final energy consumption by food and tobacco industry
  - Primary production of bagasse
  - $1000 \text{ kt} \times 7.7 \text{ MJ/kg} = 7700 \text{ TJ}$
- $385 \text{ GWh of electricity} = 385 \times 3.6 \text{ TJ} = 1386 \text{ TJ}$