CONTENT

- Overview on mechanisms and their implication of waste
  - CDM/JI
  - The European Emission Trading System (EU-ETS)
  - National demands
  - RE (Renewable Energy Directive)

- Incentives and barriers for mitigating initiatives on waste management due to ETS or other mechanisms

REDUCTION MECHANISMS

- The Kyoto Protocol lays down obligations for reduction of GHG in all industrialised countries ratifying the protocol (and new reduction target as a result of COP15?)
- The countries could basically reduce by:
  - Themselves
  - Share the obligations with other countries (i.e. EU)
  - By investments in mitigating activities in other countries (Joint Implementation or Clean Development Mechanism under UN-control)
- To improve the implementation of reductions on marked based conditions an emission trade system (ETS) is established for industries, based on quotas or allowances to emit specific amounts of greenhouse gases
  - Different ETS's are established around the world
  - EU-ETS is one, Australia is working on another and USA might introduce one by 2012

CDM: CLEAN DEVELOPMENT MECHANISM

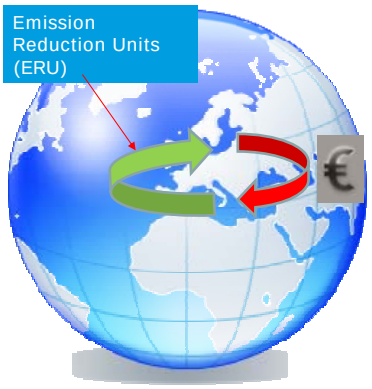
Industries or states under reduction obligations invest in greenhouse gas mitigating technologies in developing countries

The industry or state is allowed to emit an amount of greenhouse gases which correlates the avoided amount in the developing country (given as CER's)

A typical CDM on waste would be recovery of landfill gas but it has to be additional (means would not have been set up without the CDM) which is often questioned

As an actual example of CDM Denmark has invested in a CDM-project in Bangladesh, 'Brick Kilns' to compensate all greenhouse gas emissions related to travelling at the COP-15 in Copenhagen. The project substitutes numerous of outdated low efficient brick kilns with 20 high efficient kilns halving the CO2-emission to 100.000 tonnes

JI: JOINT IMPLEMENTATION



Joint Implementation is in principle a CDM but the project or initiative takes place in another country also under reduction obligations:

Industries or states under reduction obligations invest in greenhouse gas mitigating technologies in other countries under reduction obligations

The industry or state is allowed to emit an amount of greenhouse gases which correlates the avoided amount in the other country (given as ERUs)

THE EUROPEAN ETS-SYSTEM

- EU has committed itself to reduce the emission of CO2 by 21% before 2012 and by another 20% in 2012-2020
- From 2012-20 the heavy emitting sectors which emits approximately 50% of all CO2 should reduce by 30% - regulated solely by reducing the number of quotas given to these sectors
  - If industries cannot keep their emissions below the quota given they have to buy more quota (ETS) or invest in CDM/JI
- The rest of the total emission should be reduced by 10% in average which should be regulated/initiated by each Member State ('National Demands')
  - This means that each government should persuade the non-quota sectors (traffic, agriculture, individual heating and not at least the waste sector) to reduce their emissions
  - If governments do not succeed they have to invest in CDM's or JI's

NATIONAL DEMANDS OUTSIDE QUOTA SECTOR

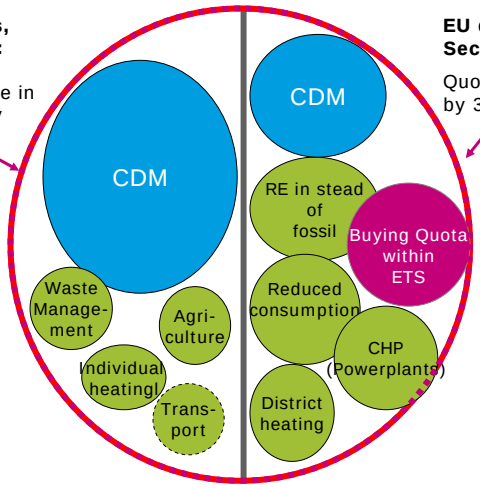
- The National demands are 10% reduction in average for the non-quota sectors but the burden has been shared according to the expected capability of each Member State
- Denmark for instance has been asked to reduce by 20% for the non-quota-sectors by 2020
- The Governments cannot buy CO2 quota but have to reduce or to buy CDM/JI if they do not succeed in reducing the emissions to the target decided for the non-quota sectors
- Creates a heavy pressure on the waste management sector to reduce its emissions
  - Unfortunately without taking into consideration any positive down stream effects (avoidance)

TOTAL REDUCTION: 20% BY 2020

National demands, non-Quota sector:

Reduction in average in non-quota sector by 10% in EU

DK 20%!



EU demands, Quota Sector

Quota to be reduced by 30%

2012-2020

Source: The Ecological Council of Denmark

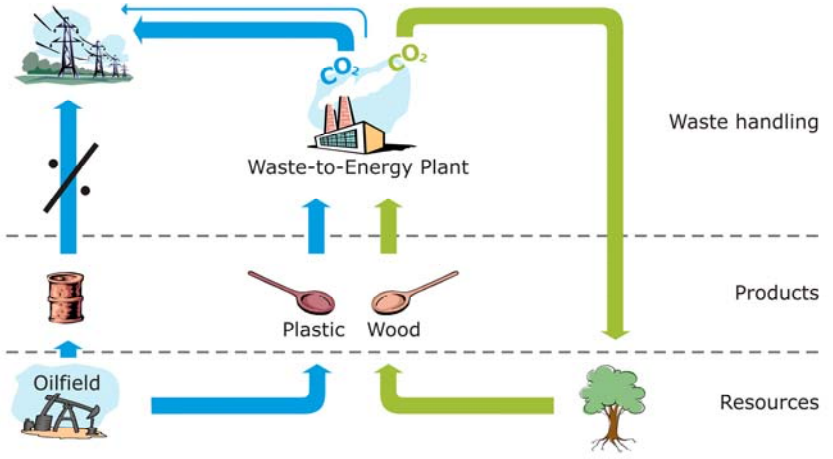
RE (RENEWABLE ENERGY)

- EU Member States have decided to convert to renewable energy
- In 2020 20% of all energy supply should be based on renewable energy sources and the share of biofuels in the transport sector should be increased to 10%
- Organic wastes are per definition a renewable energy source while wastes based on fossil carbon (i.e. plastics) are not
- Member States could as a consequence be initiated to keep organic wastes as sources for biofuels to be used in the traffic sector outside the quota sector and divert especially fossil based wastes for energy recovery inside the quota sector (i.e. power plants or cement industry)

INCENTIVES AND BARRIERS IN THE EU-ETS

- The EU-ETS do have some negative 'side effects' which in particular concerns the waste management sector
- This is due to two overall facts:
  - Waste management belongs to the non-quota sector but many of its benefits occur in the quota sector
  - Waste management often lead to benefits in other countries

CO2 FLOW IN WASTE HANDLING



CO2 CONTENT IN WASTE?

- The CO2 content should be divided into a biogenic part and a fossil part and is difficult to measure.
- Examples from waste for incineration:
  - Report from the Danish Technical University **34** kg/GJ
  - The Danish Tax Ministry **28,34** kg/GJ
  - Affald Sverige (the Swedish Waste Association) **25** kg/GJ
  - Renova (a Swedish WtE plant) **1-22** kg/GJ
- Conclusion
  - Difficult to measure
  - Variations from plant to plant and from day to day

INCINERATION: EFFECTS PENDING ON WHETHER IN- OR OUTSIDE QUOTA-SECTOR

- As long as incineration of waste is outside the quota sector:
  - All emissions is accounted for in the National greenhouse gas calculations
  - All savings is occurring in the quota sector and do not benefit the National greenhouse gas calculations
  - All savings are eliminated by the selling of quotas from the energy sector
  - There is a incentive to divert waste from the waste sector to the co-incineration in order to reach the national targets for reduction
- If only incineration is included in quota sector:
  - Waste would go to landfill if prices of quota increases (and no taxation on emissions from landfill)
  - National demands would be easier to reach as the emissions are 'leaving' non-quota sector
  - All savings will be eliminated by the selling of quotas from the original energy sector

RECYCLING: EFFECTS PENDING ON COUNTRY WHERE PRODUCTION IS AVOIDED

- When materials are recycled, the production and the related emissions are avoided somewhere else
- If production of the material is avoided in another country, this might lead to some odd consequences:
  - If avoided inside EU or in a country with reduction obligations this country would have better chances to reach its reduction targets but there will be no less emissions due to ETS
  - If avoided in USA there will be an absolute reduction (until 2012)
  - If avoided in a developing country there will be an absolute reduction
- As avoided GHG emission is not accounted for it might means less incentives for recycling and the recyclable waste might be treated by other means

CONCLUSIONS

- The waste sector offers today a portfolie of proven and cost effective technologies which contributes to GHG mitigation
- Optimisation of waste management could without doubt lead to substantial overall reductions in greenhouse gas emissions globally
- The reductions though some times occur in other countries or other sectors than where the waste management initiatives (like separate collection, sorting and pre-treatment) takes place
- The calculations of the national greenhouse gas emissions for this reason do not always give incentives to improve waste management locally even though it might contribute to mitigation of greenhouse gas emissions globally
- The ETS system might also eliminate the reductions obtained by optimised waste management

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THANK YOU FOR YOUR ATTENTION!

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