Guidance setting minimum criteria for residual municipal solid waste projects submitted for support from the Cohesion Fund

3 December 2004

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1 Introduction

1.1 PURPOSE

The Ministry of Environment is committed to ensuring that the best possible use is made of the limited financial resources available in the Cohesion Fund for environmental investments. In order to achieve this objective it is vital that decisions on which projects to support are taken based on clearly established criteria.

This Guidance establishes such minimum criteria in an important part of the waste management area – the disposal[1] of residual municipal solid waste (these terms are defined below). The information required in this Guidance must be provided at the level of project intention for all projects of the relevant type seeking Cohesion Fund support, in the form of an annex to the standard project intention form.

The Guidance is therefore intended to be used by project developers, members of the Regional Working Groups and members of the national level Cohesion Fund Working Group. The Integrated Financing Department of the Ministry of Environment will check that project intentions include the information required by this Guidance.

It is to be expected that the methodological guidance will be extended and updated in the future, following on the experiences gained in the process of using it.

1.2 SCOPE

The Guidance is intended for projects for the treatment of residual municipal solid waste. The Cohesion Fund is a financing instrument for large projects with total capital costs of more than 10 m Euro (320 m Kc). Projects with lower capital costs are supplied by other programmes.

Municipal solid wastes (MSW) means waste from households, as well as other waste which, because of its nature or composition, is similar to waste from households (following Article 2 of Directive 1999/31/EC on the landfill of waste) (Code 20 of the Waste Catalogue)

Residual MSW is understood to mean that which remains of MSW after all activities of waste minimisation and separate waste collection. Residual MSW is to be treated and disposed.

Activities of waste minimisation, separate waste collection, waste recovery and waste disposal are inseparable parts of integrated waste management systems. This Guidance focuses on the disposal[1] of residual MSW. Combined projects which include treatment of residual MSW and other aspects of waste management (such as collection, recycling and recovery) are welcomed as well.

[1] following as much treatment and recovery of material and energy as possible

2 EC Requirements and Achieving Compliance

2.1 LEGAL REQUIREMENTS

There are many legal requirements associated with MSW management, including requirements for separate collection and treatment of a number of waste streams. However the most investment-heavy requirements stem from the Landfill Directive.[2] This gives targets for the reduction of biodegradable parts of landfilled waste. In accordance with the Directive, the quantity of landfilled biodegradable MSW has to be reduced to at most

- 75 % by the year 2010
- 50 % by the year 2013
- 35 % by the year 2020

These years reflect the four-year extension provided for in the Directive for states that landfilled more than 80% of MSW in 1995, which the Czech Republic has decided to make use of.

For the Czech Republic a baseline of 1.53m tonnes of biodegradable MSW has been agreed. The required reductions are calculated from this baseline. So the quantity of biodegradable parts of MSW have to be reduced as follows:

- 1 147 500 t/y in the period 2010-2012
- 765 000 t/y in the period 2013-2019
- 535 500 t/y from the year 2020

Following the waste management hierarchy the first reduction of landfilled biodegradable parts of MSW must be reached by waste minimisation and separate collection and waste recovery. Examples are the separate collection of paper and cardboard for the purpose of recycling or the separate collection of biowaste for the purpose of composting or anaerobic digestion.

2.2 SEPARATE COLLECTION AND RECYCLING / RECOVERY WITHIN AN INTEGRATED WASTE MANAGEMENT SYSTEM

The two most important fractions existing of biodegradable products are paper / cardboard and biowaste.[3] Each unit of waste-products of these materials collected separately reduce the quantity of biodegradable MSW in the same amount.

Best practice examples, e.g. Austria and Bavaria, show the quantity of biodegradable MSW can be reduced substantially in residual solid MSW through intensive separate collection and recycling / recovery activities. Although these examples are optimistic benchmarks for the Czech Republic a relevant reduction of biodegradable MSW by means of separate collection can be considered. These effects will be partly compensated by rising quantities of MSW which are to be prognosticated.

For a planning process of the national waste management three scenarios can be described which are:

- “Optimistic” scenario which calculates with a highly effective separate collection of biodegradable with a reduction of biodegradable residual MSW by about 30 % until the year 2013.
- “Middle” scenario which calculates with a stable total quantity of biodegradable residual MSW. All increase in waste risings will be compensated by increasing separate collection
- “Pessimistic” scenario which calculates with no effective separate collection and an annual growing rate of biodegradable residual MSW of 3 %.

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2 Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste

3 The term ‘biowaste’ is used to mean separately collected kitchen and garden waste (including waste from parks, etc.)

Figure 1: Optimistic scenario

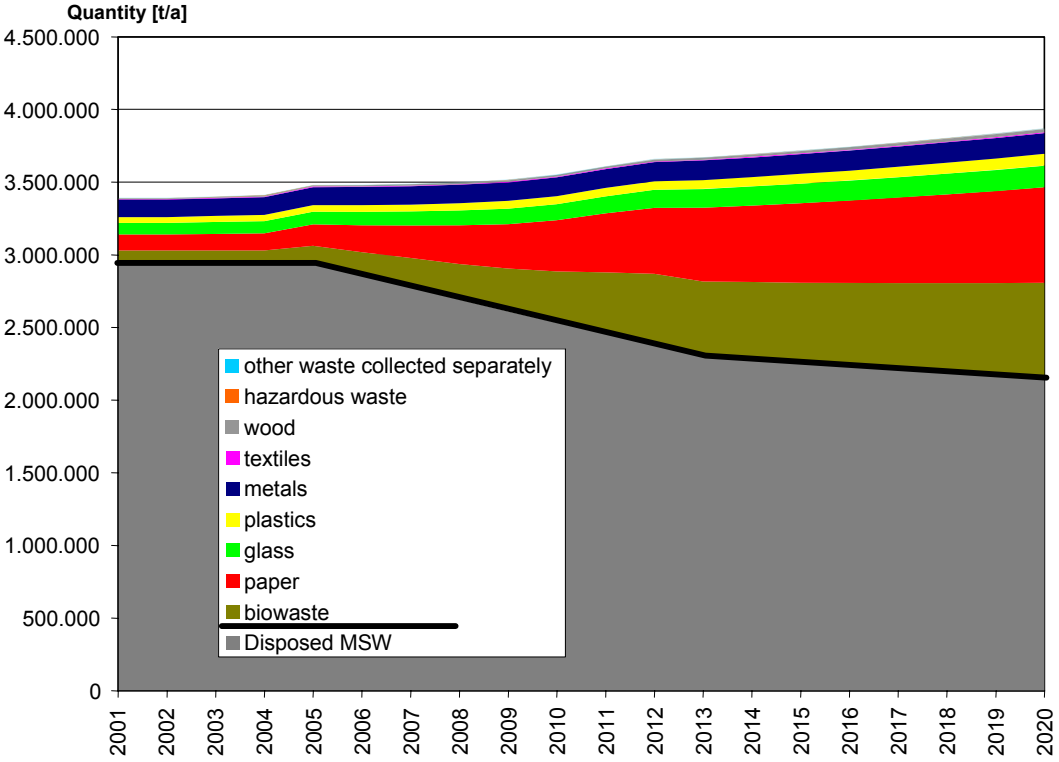
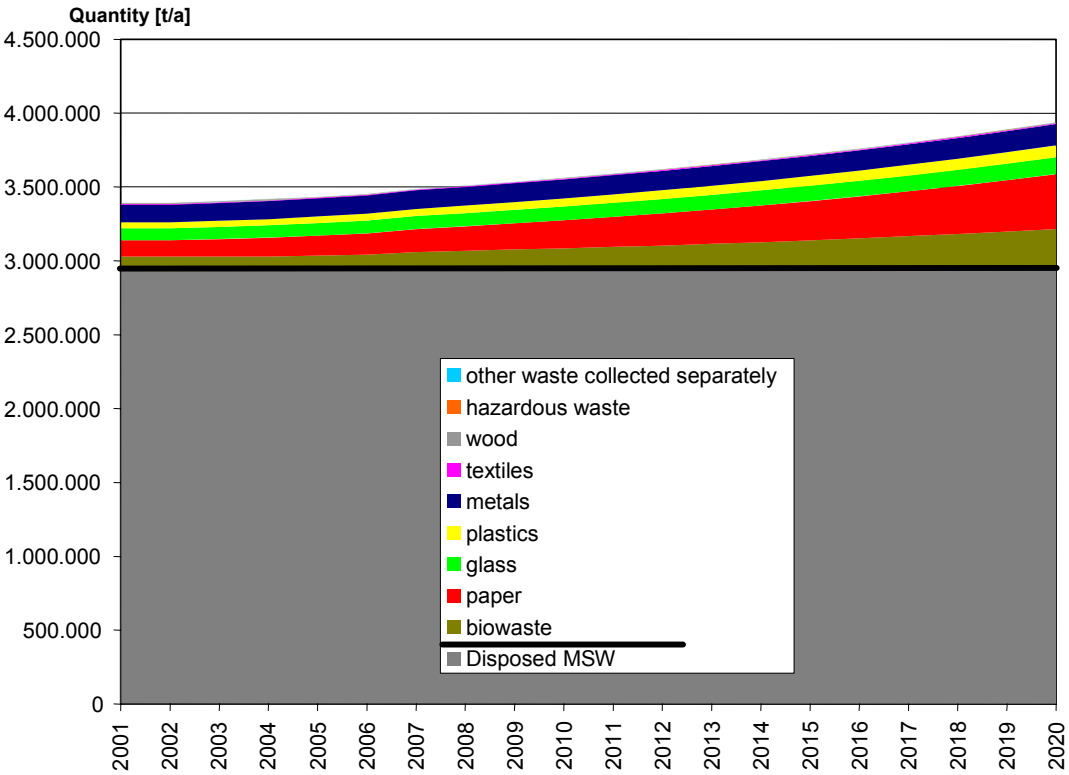


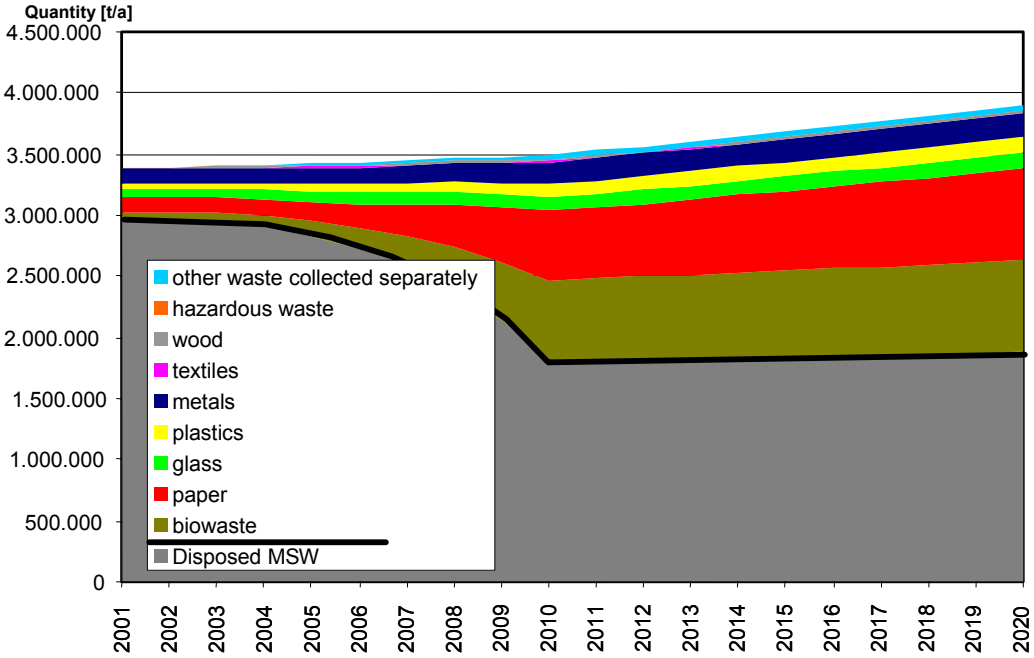
Figure 2: Middle scenario



All three scenarios described above do not meet the requirement of the National Waste Management Plan of a recycling rate for MSW of at least 50 % by the year 2010. From the situation as it is at the end of

the year 2004 this requirement cannot be met with the current policy instruments. The requirement can be met only if additional instruments are implemented which change the behaviour of municipalities and the waste management industry quickly. Currently landfilling is the cheapest treatment method of MSW. Only if landfilling becomes more expensive (or is otherwise restricted) will investments be made in other waste treatments like recycling and composting. Similarly, only if additional instruments are introduced immediately to help avoid landfilling can the scenario which is in compliance with the NWMP become realistic. The expected waste quantities for this scenario are shown below.

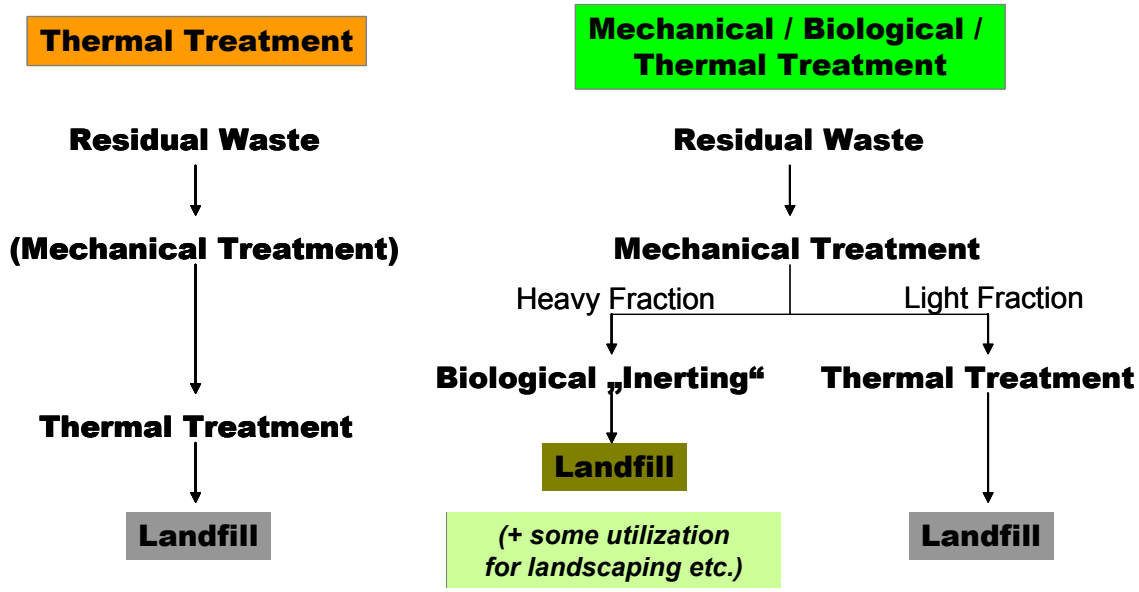
Figure 3: Scenario following the NWMP (needs additional policy instruments to be feasible)



2.3 TECHNICAL SOLUTIONS

Although waste minimisation and waste recovery are very important steps in meeting the requirements, capacities for reducing the content of biodegradable components of landfilled residual MSW will also be required (see below). The reduction of the quantity of biodegradable components of landfilled residual MSW can be done by two main types of technology: thermal treatment and biological degradation.

Figure 4: Basic technologies for stabilisation of biodegradable parts of residual MSW



Thermal treatment with energy recovery from at least the high calorific components of residual MSW is an integral part of both treatment technologies.

2.4 CAPACITIES AND INVESTMENTS NEEDED IN THE CZECH REPUBLIC

2.4.1 National Level

Currently three incineration plants for MSW are under operation in the Czech Republic. These plants will be upgraded following the EC Incineration Directive[4] in the next time. Then a capacity of 650.000 t/a will be available.

As a basis for the calculation of capacities needed it is assumed that risings of the waste quantity are captured by increasing quantities of separate collected and recovered parts of MSW. That means that the current quantity of residual MSW is calculated to be constant (see chapter 2.4.1 and scenario of figure **Fehler! Verweisquelle konnte nicht gefunden werden.**).

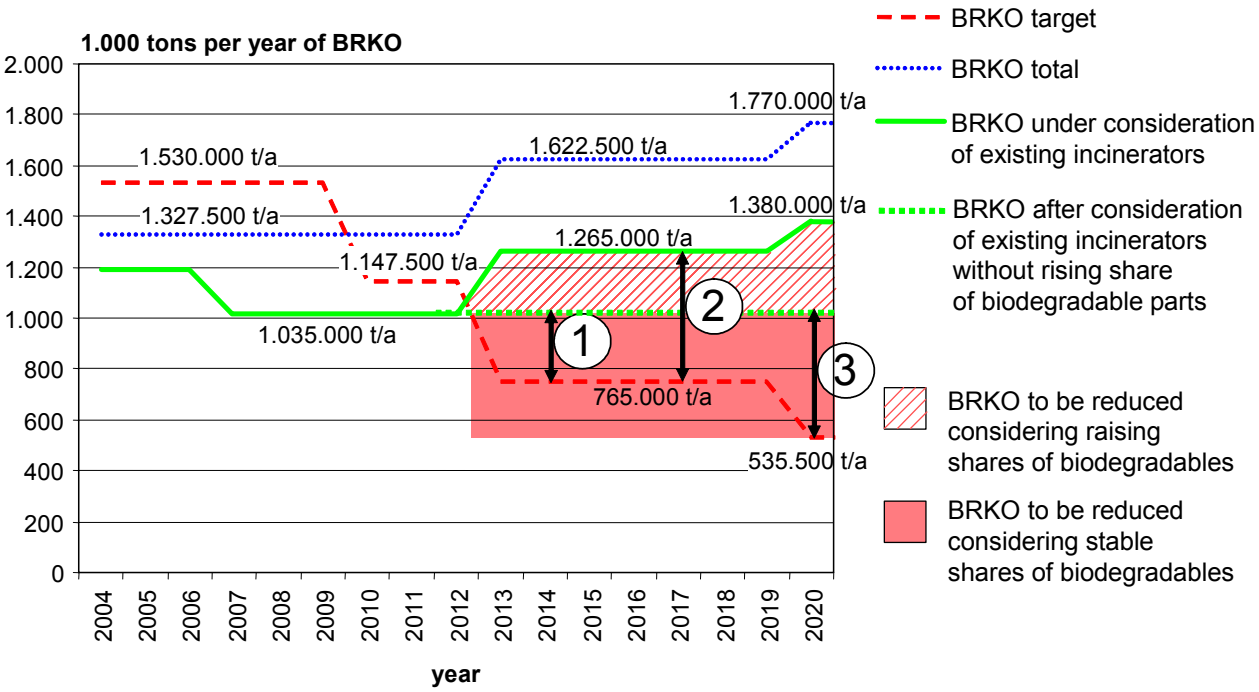
In the “optimistic” scenario it is calculated that the quantity of residual MSW decreases with 3% per year until the year 2013 and further on with 1% per year. The total quantity of MSW is unchanged in comparison with the “middle” scenario. The difference is the quantity of separate collected and recycled / recovered MSW (see figure **Fehler! Verweisquelle konnte nicht gefunden werden.**).

[4] Council Directive 2000/76/EC on the incineration of waste

2.4.1.1 Quantities of biodegradable residual MSW

The following picture shows the quantities of biodegradable residual MSW (BRKO). It shows the context between targets, current and future quantities and the reductions needed. From the reductions needed the quantities of MSW which has to be treated before landfilling are calculated (see the following section 2.4.1.2). The figure is explained in detail below.

Figure 5: Biodegradable Municipal Solid Waste in the Czech Republic: Targets, expected development and reductions needed – middle scenario



Note: BRKO = **b**iologicky **r**ozložitelný **k**omunální **o**dpad (biodegradable municipal solid waste)

- The broken line starting with 1 530 000 t/yr (red line) shows the national targets for landfilled biodegradable MSW (BRKO) given by the Landfill Directive. The baseline has been agreed with the European Commission in the accession process.
- The dotted line starting with 1.327,500 t/yr (blue line) shows the expected total quantity of biodegradable MSW following the calculation method proposed by the Ministry of Environment ("*metodika BRKO*"[5]) which anticipates an increase in the share of biodegradables in landfilled MSW from the current level of 45% to 60% from the year 2020. These figures are to be used only if no results of waste analyses are available. If such data are available they are to be used as the basis for the calculation.
- The full line (green line) considers the capacity of the three existing MSW incineration plants. If they operate with full capacity of 650 000 t/yr (and treating only residual MSW from the Czech Republic, no other wastes) the 2010 target can be met. The green line considers a treated quantity of 300.000 t/yr to the year 2006 and operation at full capacity of 650 000 t/yr from the year 2007.

  Considering the raising shares of BRKO in residual MSW as prescribed in the *"metodika BRKO"* the incineration of 650.000 t/yr of residual MSW reduces the landfilled biodegradable MSW by 292.500 t/yr in the period 2007 to 2012 (650.000 t/yr * 45% = 292.500 t/yr) by 357.500 t/yr in the period 2012 to 2019 (650.000 t/yr * 55% = 357.500 t/yr) and by 390.000 t/yr from the year 2020

[5] Ministry of Environment of the CR: Methodology of calculation for gradual reduction of landfilled quantity of biodegradable municipal waste (*Metodika výpočtu postupného snižování množství biologicky rozložitelných komunálních odpadů (BRKO) ukládaných na skládky*) (draft, June 2003). This methodology only has the status of a recommendation, not a requirement.

(650.000 t/yr * 60% = 390.000 t/yr)

It is to be seen that the decreasing targets (broken red line) and the future quantities of landfilled biodegradable parts of MSW (full green line) cross each other with the year 2013. This means that from this year on the target is according to this scenario in not fulfilled (full green line).

In the case of the optimistic scenario the targets of the year 2013 could be met without additional stabilisation capacity. The existing incineration capacity of 650.000 t/a would be enough until the year 2020.

Figure 6: Biodegradable Municipal Solid Waste in the Czech Republic: Targets, expected development and reductions needed – optimistic scenario additionally shown

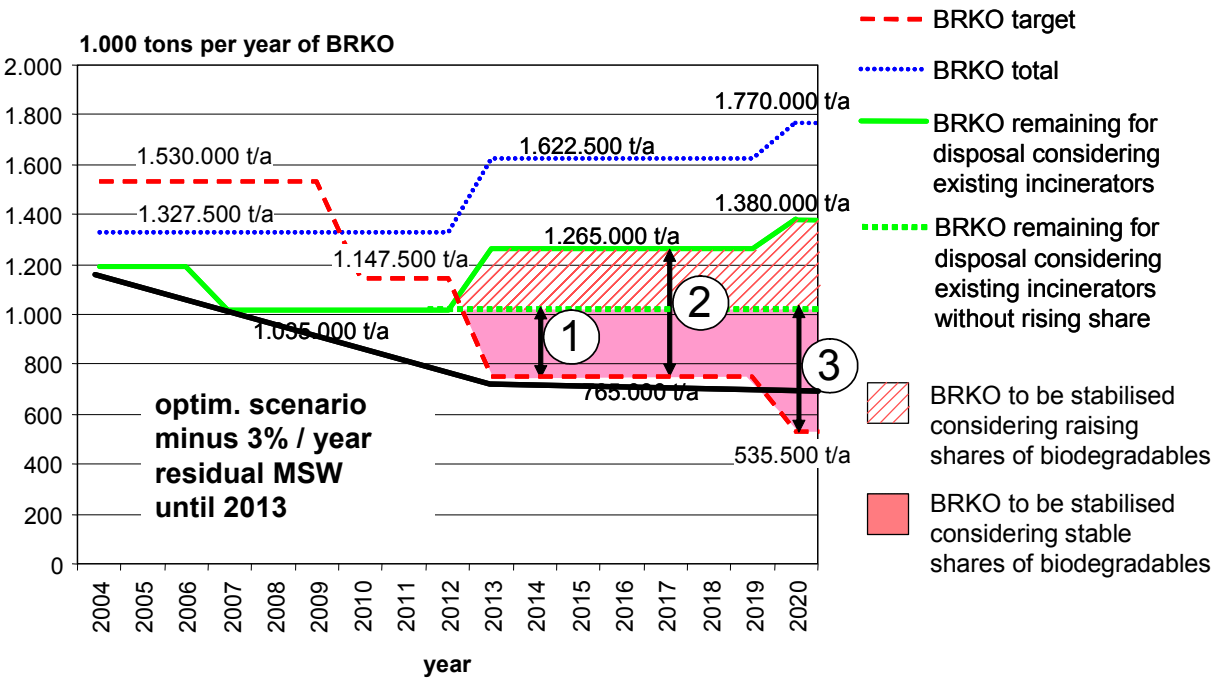
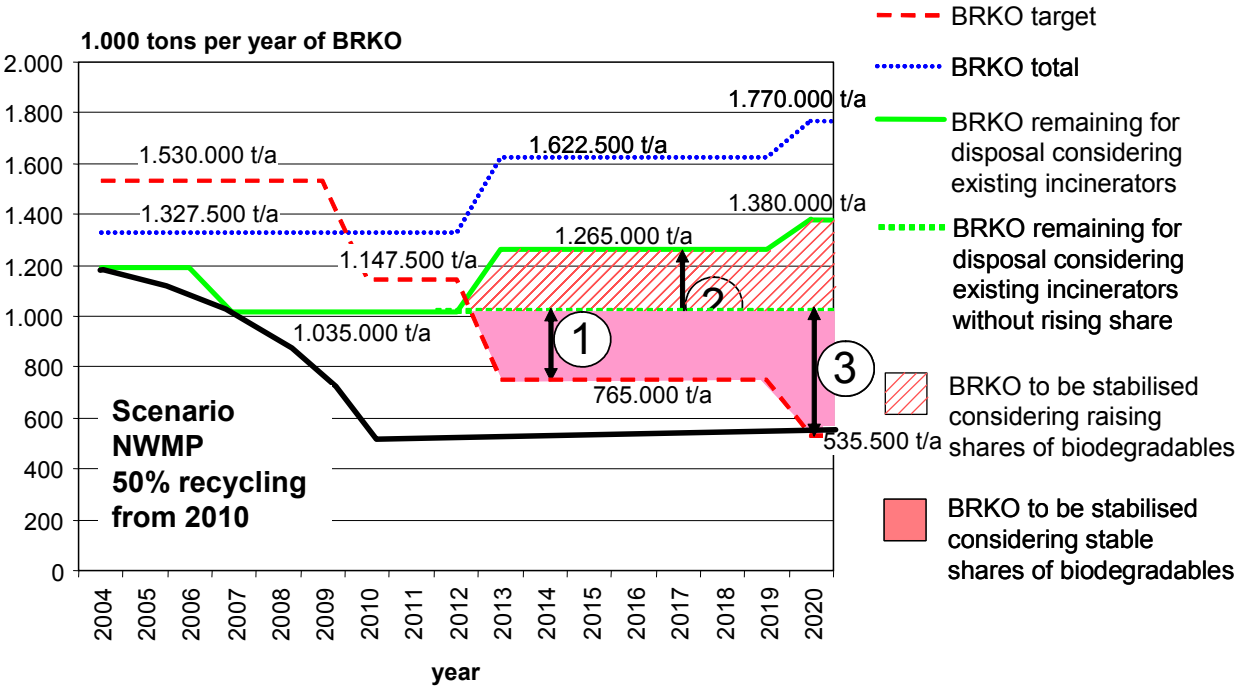


Figure 7: Biodegradable Municipal Solid Waste in the Czech Republic: Targets, expected development and reductions needed – scenario following the requirements of the NWMP additionally shown



2.4.1.2 MSW-Treatment-Capacities needed

From the difference of the targets and the in future existing quantities of BRKO it can be calculated which quantities of residual MSW have to be treated before landfilling - either by incineration or by mechanical-biological means.

First **it is to be stressed that the landfilled biodegradable MSW should be reduced substantially by means of separate collection and recycling of especially paper/cardboard and biowaste (garden and kitchen waste).** The targets of the National Waste Management Plan are reminded:

- to "*increase the material recovery of municipal waste to 50% by 2010*" (chapter 3.6)
- to "*the maximum degree, increase the material recovery of kinds of waste constituting BDMW separated from municipal waste, especially paper and cardboard*" (paragraph 3.8 c)
- "*prefer composting and anaerobic decomposition of biologically degradable wastes* (except paper/cardboard) *…, with use of the final product particularly in agriculture, in reclaiming and landscaping; wastes that cannot be used in this manner should be processed to fuel or used for energy production*" (paragraph 3.8 h)

Nevertheless from the year 2013 additional capacities for treatment of residual MSW are needed in the case of the middle scenario. Calculating a stable share of biodegradables in disposed MSW **additional capacities of at least 600.000 t/yr are needed** (depicted in Figure 5**Fehler! Verweisquelle konnte nicht gefunden werden.** and Figure 8 with ①). This is a conservative calculation and the figure has to be seen as a minimum.[6] The calculations concerns the need of a BRKO-reduction of 270.000 t/yr divided by a share of BRKO in residual MSW of 45 % (1.035.000 t/yr - 765.000 t/yr = 270.000 t/yr; 270.000 t/yr ÷ 45% = 600.000 t/yr).

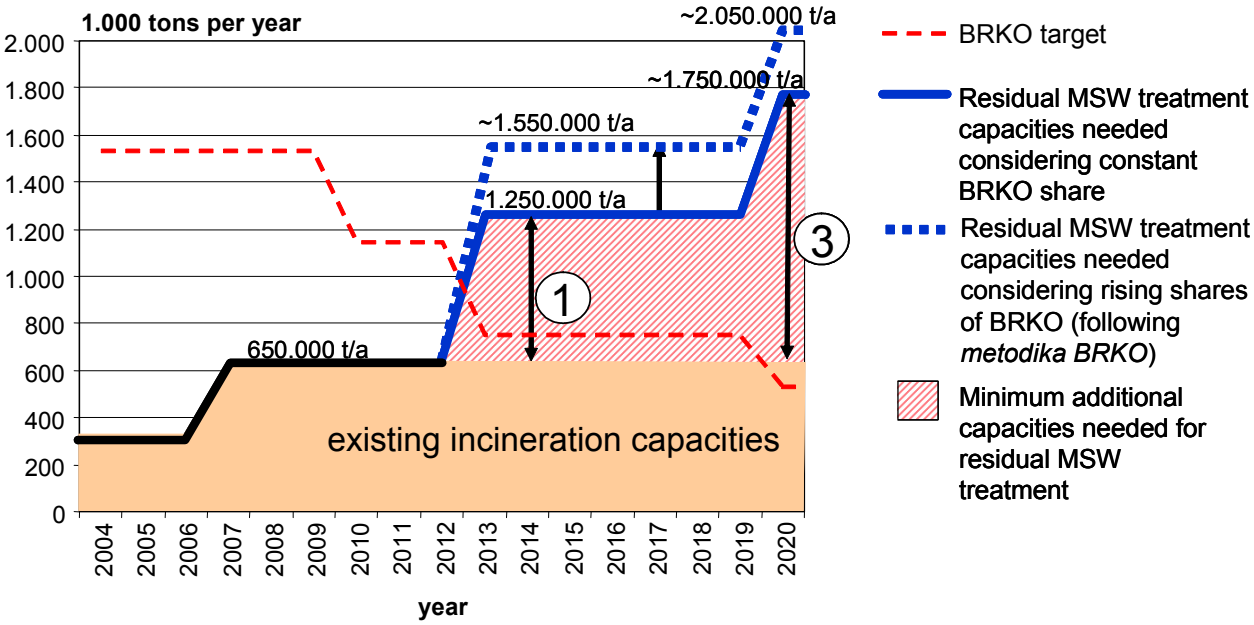
[6] In fact this calculation is not in line with the "*metodika BRKO*". The approach assumes that waste analyses will show constant - and not rising - shares of biodegradables in disposed MSW. But the share of total biodegradable waste in total MSW arisings is calculated to be 60 %. This figure includes separately collected biodegradable MSW (especially biowaste and paper) as well as biodegradable parts of residual MSW.

Following the *metodika BRKO*- calculation method additional capacities of 900.000 t/yr are needed (depicted in Figure 5**Fehler! Verweisquelle konnte nicht gefunden werden.** and Figure 8 with ②); calculated with 1.265.000 t/yr - 765.000 t/yr = 500.000 t/yr; 500.000 t/yr ÷ 55% = 909.091 t/yr.

From the year 2020 additional capacities of at least 1.100.000 t/yr are needed for treatment of residual MSW (depicted in in Figure 5**Fehler! Verweisquelle konnte nicht gefunden werden.** and Figure 8 with ③). Calculation: 1.035.000 t/yr - 535.500 t/yr = 499.500 t/yr; 499.500 t/yr ÷ 45% = 1.110.000 t/yr

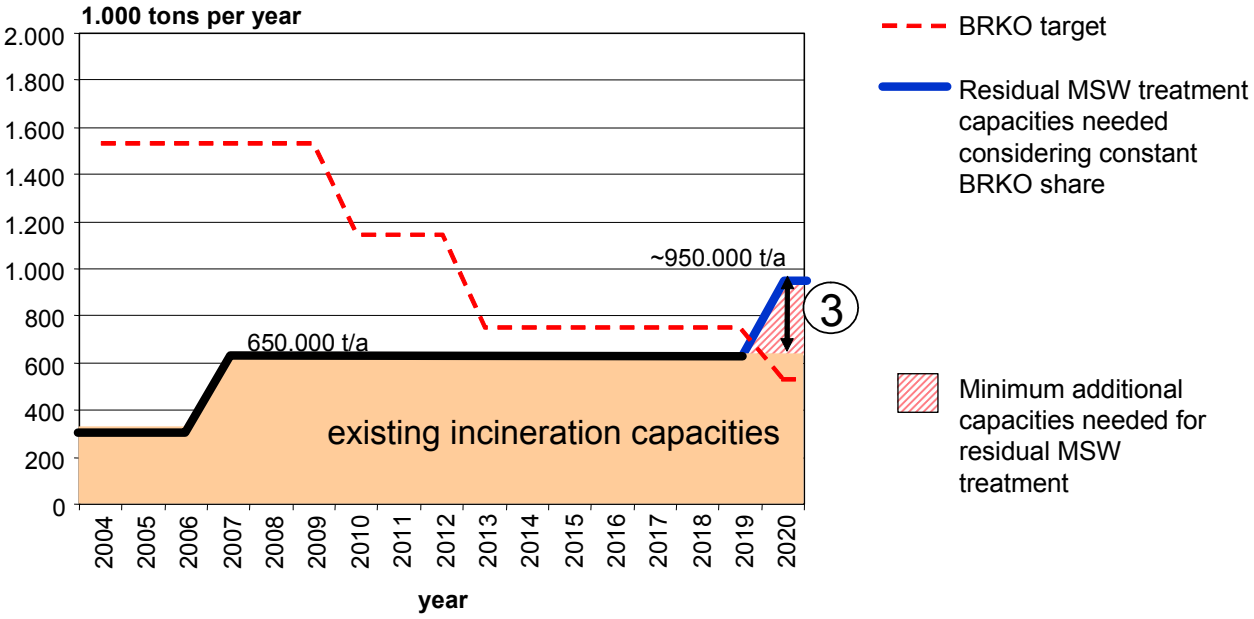
In the case of an increasing share of biodegradable MSW according to *metodika BRKO* additional capacities of about 1.4m t/yr would be needed. Calculation: 1.380.000 t/yr - 535.000 t/yr = 844.500 t/yr; 844.500 t/yr ÷ 60% = 1.407.500 t/yr

Figure 8: Capacities for MSW-treatment needed to meet the targets of the Landfill Directive - middle scenario



In case of the optimistic scenario no additional treatment capacities for residual MSW are needed. For meeting the targets of the year 2020 capacities of about 950.000 t/yr would be needed of which 650.000 t/yr are existing.

Figure 9: Capacities for MSW-treatment needed to meet the targets of the Landfill Directive - optimistic scenario



In case of the scenario which is in line with the requirements of the NWMP the targets of the Landfill Directive could be met without any additional treatment capacities for residual MSW, i.e. only by means of separate collection and recycling / composting. The need for additional policy instruments to make this scenario realistic is however reminded.

2.4.1.3 Investments needed

2.4.1.3.1 Middle Scenario

To install the additional capacities like described above investments in a range of Kc 6.6 billion to Kc 11.4 billion (depicted in Figure 5**Fehler! Verweisquelle konnte nicht gefunden werden.** and Figure 8 with ①) respectively Kc 10.0 - 17.3 billion (depicted in figure **Fehler! Verweisquelle konnte nicht gefunden werden.** and with ②) have to be estimated needed until the year 2012. The range of the investment is dependent from the chosen technology.[7]

Until the year 2020 the investments needed are to be estimated with a range of Kc 12.2 billion to Kc 21.1 billion (depicted in in Figure 5**Fehler! Verweisquelle konnte nicht gefunden werden.** and Figure 8 with ③).

2.4.1.3.2 Optimistic Scenario

[7] The calculation uses the following input data which are ranges from realised projects in EC member countries and which are in compliance with EC-legislation (source: Twinning team, based on information from recently realised projects) –
- specific investment costs for mass burn incinerator facilities per installed capacity: Kc/t 13,000 - 19,000
- specific investment costs for mechanical biological treatment plants per installed capacity: Kc/t 4,500 - 7,500
- share of high calorific output from mechanical biological treatment plants: 50% by mass
- energy content of high calorific output from mechanical biological treatment plants is recovered in incineration facilities with the same specific investment costs as mass burn incinerators

In case of the installation of efficient collection systems for biodegradable MSW, especially paper/cardboard and biowaste (optimistic scenario) the targets of the Landfill Directive could be met with the existing facilities until the year 2019. From the year 2020 additional 300.000 t/yr of stabilisation capacities would be needed which would need investments of Kc 3.5 - 6.0 billion (depicted in Figure 9 with ③).

2.4.2 Regional Requirements

In order to apply the nationwide target at regional level the *metodika BRKO* has been developed by the MoE.[8] This methodology has to be used by the regions for calculating the regional targets. **Each region is responsible for meeting its regional target, though it is possible for the regions to cooperate in achieving their targets.**

It should be noted that the Cohesion Fund will not be able to support all facilities needed to secure compliance with EC Directives. Under these circumstances projects that are developed early and which make a significant contribution to meeting the targets will be those that receive funding.

2.5 REQUIREMENTS OF THE NATIONAL WASTE MANAGEMENT PLAN

The NWMP generally puts strong emphasis on the 'top' part of the waste management hierarchy, i.e. on the prevention of waste arisings, followed by their material re-use and recycling (see especially points 3.1 and 3.6). For this reason all residual MSW projects seeking support from the Cohesion Fund must be part of an integrated waste management system with sufficient emphasis on these activities. The Plan also however sets out of a number of requirements in relation to the disposal of residual MSW.

Concerning existing **landfills** the National Waste Management plan declares the intention to *"provide support for conversion of the existing landfill premises into complex waste management centres."*[9] which could represent pre-treatment by an MBT plant or other additional recovery / recycling activities at landfill sites. The NWMP also specifically (in point 3.8f) supports the construction of **mechanical-biological treatment** plants.

The following principles are listed under point 3.4 of the binding part in relation to the "*the target to create integrated systems of waste management at a regional level and connect them to a national establishment for waste management"* and are particularly relevant to the **thermal treatment** (incineration and co-inceration) of wastes:

"*i) do not provide support for the construction of new incinerators of municipal waste from state funds;*

m) provide for the necessary capacity for treatment of wastes suitable for processing as fuel unless their material recovery is more suitable;

n) provide for the use of suitable and available technologies for the use of fuels produced from wastes". [10]

Given the objective to create integrated systems and the general waste management hierarchy of the Act on Waste 185/2001 Coll. as well as the EC Waste Framework Directive (disposal with use of energy is preferred over disposal with no use of energy) incineration plants with energy recovery and other co-incineration or thermal treatment plants are one essential part of such integrated systems.[11] That means that incineration facilities for residual MSW or fuel derived from it can be supported from the Cohesion

8 Ministry of Environment of the CR: Methodology of calculation for gradual reduction of landfilled quantity of biodegradable municipal waste (Metodika BRKO)

9 National Waste Management Plan, Part III - Binding Part, Section 3.7 (h)

10 National Waste Management Plan, Part III - Binding Part, Section 3.4

11 Note: Incineration of residual MSW and of high calorific fractions of MSW with energy usage is to be understood as energy recovery in the sense of the Act on Waste, Section 23 (1)

Fund providing that energy is recovered and given the existence of an integrated waste management system of which the project is part. Landfilling of high calorific outputs of MBT plants as a result of not (financially) supporting the provision of appropriate thermal recovery capacities would be in conflict with the EC Waste Framework Directive (75/442/EEC, as amended).[12]

2.6 MINIMUM TECHNICAL STANDARDS

2.6.1 Mechanical-biological treatment (MBT) plants

Neither EC nor Czech legislation sets detailed technical requirements for MBT plants. Nevertheless an important purpose of MBT plants is to stabilise waste before landfilling. Stabilisation means a large reduction of the biodegradable content.

A Draft Reference Document on Best Available Techniques of the European IPPC Bureau of the European Commission[13] describes general requirements which have to be considered by the applicant (see Annex). The IPPC regulations require best available techniques for MBT plants with a capacity of more than 50 tonnes per day (about 17,500 tons per year).

Considering the basic objective of stabilising biodegradable MSW to achieve compliance with the Landfill Directive, MBT projects will be eligible for Cohesion Fund support if they meet the following basic condition:

- Output materials from MBT plants that are expected to be landfilled have to be stabilised. This means the reduction of the decomposition properties to such an extent that offensive odours are minimised and that either the Respiration Activity after four days (AT_4) is below 10 mg O_2/g dry matter or the Dynamic Respiration Index is below 1 000 mg O_2/kg VS/h.[14]

2.6.2 Incineration plants

Thermal treatment plants can be
- mass burn incinerators
  or
- specialised incinerators for high calorific wastes
  or
- facilities co-incinerating processed parts of residual MSW
  or

other types of thermal treatment.

The Incineration Directive gives specific requirements for waste incineration. Additionally BAT (best available techniques) have to be applied. The requirements of BAT are defined in a Draft Reference Document on Best Available Techniques for Waste Incineration of the European IPPC Bureau of the European Commission.[15]

For preparing waste to be used as fuel the best available techniques are described in the draft document "Best Available Techniques for the Waste Treatment Industries" (see footnote 13).

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12 see Article 3, as amended by Directive 91/156/EEC.

13 European Commission, DG Joint Research Center, European IPPC Bureau: Draft Reference Document on Best Available Techniques for the Waste Treatments Industries, draft January 2004, http://eippcb.jr.es

14 The verb "stabilisation" is defined in this way in the European Commission's Working Document "Biological Treatment of Biowaste", 2nd draft, 2001. In comparison to the limit of this draft for the respiration activity AT_4 of 10 mg O_2/g dry matter the Austrian Landfill Regulation requires a respiration activity AT_4 of less than 7 mg O_2/g dry matter.

15 European Commission, DG Joint Research Center, European IPPC Bureau: Draft Reference Document on Best Available Techniques for Waste Incineration, draft March 2004, http://eippcb.jr.es

2.7 CONCLUSIONS

Although it is possible for separate collection systems to achieve a reduction in residual municipal waste large enough to meet the target of the Landfill Directive for 2013, the achievement of the target in this way requires immediate and large-scale action. Whilst steps are currently being taken to expand separate collection of biowaste and paper / cardboard, it is at present not considered likely that the current development of separate collection will alone be sufficient to meet the 2013 target. For this reason it is considered justified to plan for the installation of an additional capacity for the stabilisation of residual MSW of 100.000 t/yr to 200.000 t/yr from the year 2013, and at least 300.000 t/yr from the year 2020. To deliver these capacities investments ranging from at least Kc 2 to 3 billion are needed up to the year 2012 and Kc 4 to 6 billion up to the year 2020.

The requirements of the NWMP for recycling of at least 50% of the MSW by the year 2010 can become realistic only if additional instruments will be implemented which make separate collection and recycling / recovery / composting much more advantageous in comparison with landfilling.

The facilities for treatment and disposal of residual MSW have to be part of an integrated waste management system, with sufficient emphasis placed on separate collection and recycling / recovery activities. Neverthless, the need for the disposal of residual MSW remains, and mechanical-biological treatment plants as well as thermal treatment plants are therefore essential parts of an integrated waste management system. The choice of which combination of treatment methods is the best should be made following an assessment of different options.

Given the need for additional treatment capacities of about 150.000 t/yr within eight years and the usual time requirements from first planning to the start of operation, **the development of new facilities is now urgent** (in the year 2004). For this reason **it is expected that one project for the stabilisation of residual MSW will be approved for Cohesion Fund support in the period to the end of 2006.**

In order to ensure that the limited resources available in the Cohesion Fund are used in the most efficient way, **a (pre)feasibility study must be available as an annex to the project intention**. The purpose of the study is to describe the proposed project and, just as important, to explain why the proposed project represents the best used of the available public funds by undertaking a comparison of options.

The study must cover at least the points described in chapters 3, 4 and 5. The study must either follow the given structure or contain a table that clearly indicates where the information relating to each of the numbered points is given.

3 The Need for the Project

3.1 DESCRIPTION OF PROBLEM TO BE SOLVED

1) Relevant Targets and requirements given by Landfill Directive, National Waste Management Plan and Regional Waste Management Plan, including for instance
    - BRKO reduction
    - Waste Management Hierarchy
2) Contribution of the project in meeting the relevant target(s) / requirement(s)
    - BRKO reduction
    - Any other relevant targets like sewage sludge disposal, thermal recovery of separate collected parts of MSW, etc.
3) Catchment area, basic figures
    - Involved regions / municipalities
    - Number of residents
4) Description of the whole MSW management system of the catchment area and other measures taken or planned to be taken in parallel

3.2 CURRENT SITUATION AND FUTURE PROJECTIONS

1) Waste quantities
    - Current waste quantities and statistical basis of the figures, declaration of the data source
        - Residual MSW
        - Separate collected parts of MSW such as paper, glass, metals, plastic packaging, biowaste, hazardous waste, bulky waste, waste electrical and electronic equipment
    - Expected waste quantities and explanation of the assumptions used in estimating them, for at least two future points in time
        - In about 5 years
        - In about 10 years

      It is preferable, if possible, to have a year-by-year projection up to the year 2020.
2) Description of the sources of the waste(s) e.g. municipal collection, other waste collection companies, industry and institutions, municipal services
3) Current treatment methods and why the current treatment methods have to be changed (briefly)
4) Estimated waste composition and waste characteristics relevant for the project including
    - Composition
    - Calorific value
    - Contamination with impurities

   currently (based on available data) and as expected in the future, as before at least for two points in time
    - In 5 years
    - In 10 years

4 Comparison of Options

4.1 SYSTEM BOUNDARIES

The comparison of options has to be done within the same system boundaries. Therefore the system boundaries have to be defined. The study must make clear which activities are taken into consideration for the assessment and which activities not.

The following activities have to be part of the assessment in any case:

- Long-distance transport from the source of the waste(s) (e.g. a transfer station) to the planned facility; waste collection activities do not have to be considered
- Treatment of residual MSW i.e. activities within the planned project
- Further treatment (reuse, recovery, disposal) of all outputs of the plant including solid, liquid and gaseous outputs and including all main products, by-products and emissions.

It is preferable to include the whole MSW management system including separate collection and recycling of parts of MSW within the system boundaries. In such a case the system boundaries must be expanded to include waste collection.

4.2 ASSESSMENT OF OPTIONS

1) Listing of different options which could solve the problem with a short description of each
2) Qualitative presentation of advantages and disadvantages of options which are taken into further consideration
3) Explanation / justification of why some options are not taken into further consideration
4) Description of the evaluation method. The evaluation has to contain at least:
    (a) Conformity with legal requirements
    (b) Conformity with National Waste Management Plan of the Czech Republic and Regional Waste Management Plans as well as regional energy policies and other relevant regional policies
    (c) Contribution to the main goal of the project (BRKO reduction)
    (d) Effects on the environment
        - Energy consumption / production (to be quantified)
        - Transport in tonne kilometres [t.km] (to be quantified)
        - Emissions to the air
        - Emissions to the water
        - Solid residues of the process (to be quantified)
    (e) Consumption of materials and water
    (f) Effects on regional development, at least
        - Employment
    (g) Technical linkages to other facilities in an integrated waste management system
    (h) Investment costs, operational costs and cost effectiveness (specific costs per tonne of input material) following the structure of section 4.4. 2) - 4). The calculation basis and the data sources have to be declared and described. Note: This calculation for the basic comparison of options has to be done without considering any grant funding.

(i) Calculation of how much grant is needed to achieve cost competitiveness with landfilling. For the purpose of a comparison a price of 800 Kc/t plus 500 Kc/t of basic fee rate which is to be paid from the year 2009 (Act on Waste Annex No. 6) should be used for landfilling (2003 price level).[16]

(j) Treatment / disposal of wastes from the process and management of any other residuals (outputs) and regional or national capacities available for this treatment.

5) Sensitivity analysis: Which factors influence the results of the analysis most, for example

- revenues for energy
- prices / market situation for refuse derived fuel
- connection to district heating system
- prices for disposal of residuals (landfill)
- rate of utilisation

The sensitivity analysis has to be a quantified analysis which shows the impact of changes of the different factors on the overall price per tonne treated.

6) Risk analysis: A qualitative discussion of other factors that could influence the choice of preferred option (e.g. what happens if more / less waste arisings, if composition of waste changes, etc.)

7) The final choice of option needs to be very clearly explained based on the analysis of the above points. It is recommended that a multi-criteria analysis approach is adopted to make the process transparent. In this case the criterion cost-effectiveness (i.e. cost per tonne of treated input material) must however count for at least half the overall score within any weighting system of the various criteria.

[16] This price level assumes a rise in the basic cost of landfilling (i.e. excluding the landfill charge) as a result of the need to upgrade existing landfills to meet EC standards and the associated closure of smaller - non-compliant - landfills.

5 The Preferred Option

5.1 DESCRIPTION OF CHOSEN OPTION

1) Description of treated types of waste and their sources
2) Catchment area
3) Summary technical description of the chosen option
    - Location
    - Existing infrastructure
    - Capacity
    - Summary description of the technical process
    - Connection with / to other existing or planned facilities
    - Description of output materials and their further recovery / disposal
        - Products
        - Residues / wastes
        - Emissions
4) Basic description of the flow of materials and energy (mass and energy balance)
5) If other wastes than MSW are to be treated: how is the Polluter Pays Principle to be implemented? For instance, grant support could be provided only for the share of investment costs equal to the share of the capacity planned to be taken by MSW.
6) Availability of waste for the planned plant. Which measures are taken / will be taken to secure the delivery of waste to the facility in the calculated quantity and with the calculated price. A key issue is the cost competitiveness with alternative treatment methods, at least with landfilling (see point 6 under 4.4 below). It is also necessary to document the position of important towns and municipalities within the proposed project's catchment area from the point of view of ensuring a supply of residual MSW to the proposed installation(s).

5.2 COSTS

1) Pre-project costs (e.g. surveys, land-use decisions, building permits, cost of documentation for selection of a contractor)
2) Planned Investment
    - Total investment costs
    - Depreciation periods for different types of plant (split into at least the following categories: civil engineering, technology, mobile equipment)
    - Specific investment costs in EUR and Kc per tonne of waste input, including a cost of capital (e.g. 5-7%)
3) Operational costs
    - Repair and maintenance
    - Energy
    - Consumables
    - Labour
    - Specific operational costs in EUR and Kc per tonne of waste input

4) Earnings, total and specific (in EUR and Kc per unit of product sold)
    - From selling energy
    - For selling products

   Note: not earnings from the price charged by the installation concerned for the main service of waste treatment / disposal, but other earnings that influence this price
5) Expected rate of support based on achieving cost competitiveness with landfilling and any other arguments why grant / support is required
6) Approximate financial plan – i.e. sources of the capital required to cover (at least) investment costs
7) Desirable:
   Comparison of the specific investment and operational costs as well as specific earnings with comparable benchmarks of realised plants in EC member states.

5.3 ORGANISATION

1) Basic data concerning the investor. This data must include a qualitative and quantitative description of the financial, organisational and technical resources of the entity. These resources may be provided by project partners linked to but not identical with the entity applying for financial support. In this case it should be explained how the resources brought by the partners will be available in a real sense to ensure the successful implementation of the project.
2) Basic data concerning the operator (if a separate entity), covering the same points as above for the investor.
3) Relationship between owner/investor and operator, including method of selection of any private partner (approach to public-private partnership, if proposed)
4) Basic data on owner of any other infrastructure linked to the project (e.g. district heating system)
5) Time schedule with milestones concerning
    - Planning
    - EIA, Natura 2000 and IPPC, and any other permitting procedures
    - Start of construction
    - Start of test operation
    - Start of regular operation

6 Annex Best Available Technique for MBT-plants

The following requirements are described in a draft reference document of the European Commission, DG Joint Research Centre, European IPPC Bureau. The concerned draft is dated from January 2004. It is to be stressed that the draft document can be changed.

The requirements shown below are examples and are not an exhaustive list.

4.2.2. Specific storage and handling techniques to consider in biological systems

Description

Some techniques to consider related to storage and handling techniques in biological waste treatment include:

a. having a reception pits or equalisation tanks
b. housing and equipping the bunker area with an exhaust air collection device e.g. dust removal facility. Air exchanges rates of 3 or 4 per hour are common
c. purifying the exhaust air or re-using it e.g. as supply air for rotting
d. keeping the pollution of the exhaust air low by :
   - avoiding traffic routes through the delivery area
   - using surfaces and work equipment that are easy to clean
   - minimising the storage time of wastes in the delivery area
   - cleaning the floor of the hall regularly with an appropriate sweep-suction cleaner or industrial vacuum cleaner
   - cleaning sunshades, conveyor bands and other equipment at least once per week
e. using a combination of automated and rapid action doors with so-called air curtain installations, which in practice could also act as a lock, with the opening times of the doors being kept to a minimun. This can be helped by the insertion of sensor-controlled rolling shutter gates or flap gates and by sufficient dimensioning of the manoeuvring area in front of the hall
f. recognising that the discipline of the hall and vehicle fleet staff is at least equally important to actually realise the short opening times, and ensuring that they carry out sufficient maintenance of the doors as required and stick to the appropriate operation
g. installing an air curtain which creates a curtain of surrounding air in the open door that prevents the ingress of air from the hall. For an underground bunker, which the vehicles approach backwards and then tip over their load, the installation of a curtain with the vehicle outline behind the actual door may a way to minimise air exchange during unloading as far as possible.

In addition during storage and handling, the following measures are suitable for dust minimisation:

h. depositing dust through defogging systems, although this is not mandatory
i. using suction to extraction point sources and hall air, with subsequent dedusting
j. applying coverage of the belt conveyor
k. preventing or minimising large falling heights at interband transmissions
l. using slowly running communition aggregates
m. regularly cleaning aggregate areas, hall floors and traffic routes.

4.2.3 Selection of feedstock for biological process

b. adding sewage to the organic fraction of municipal solid waste increases the nutrient level as well as adds moisture content. Other wastes that also can have benefits are organic industrial wastes, food processing wastes and agricultural wastes

4.2.11 Management of exhaust gas in MBTs

Description

A good exhaust gas/exhaust air management system contains the following elements:

a. separate collection of exhaust air partial flows
b. minimisation of the exhaust gas through multiple use/cascade-use, circular guidance
c. minimisation of the exhaust gas through anaerobic degradation of organic substances (fermentation with utilisation of biogas instead of rotting)
d. treatment of partial flows with a combination of biological, chemical, physical and thermal treatment components
e. reduction of specific exhaust air emissions to 2500 to 8000 Nm^3 per tonne of waste by installing circular guidance across heat-exchangers and by discharging the excess heat as a pre-condition for an effective circular guidance
f. re-use of the exhausted air as far as possible. The remaining air needs to be treated before being disposed of to the atmosphere
g. treatment of the exhausted gas from the delivery area, such as low bunkers and underground bunkers with or without mechanical treatment of the delivered wastes or the recycling of the gas as the air supply (process air) for rotting
h. installation in closed rooms with locks or equivalent facilities of the unloading sites, feed bunkers and receiving bunkers or other equipment for delivery, transport and storage of the input substances. The aim of this measure is the minimisation of diffuse emissions. In locks this is achieved by suction of the lock area so as to keep the ambient pressure below atmospheric pressure
i. for machines, apparatuses or other equipment used for mechanical treatment or for physical separation of the waste, e.g. by crushing, classing, sorting, mixing, homogenising, dewatering, drying, pelletising or pressing, the management system needs to ensure that potential diffuse emissions are minimised through encapsulation or suction (focal point suction) of the individual aggregates
j. use of closed containers for the removal of dust emitting goods
k. used of encapsulated or housed systems for the conveyance and treatment of fermentation residues. The exhaust air from these systems is to be collected (hall and source suction), preferrably so it can be re-used within the process or for it to be treated

l. splitting of the total volume flow that is to be treated into heavily polluted exhaust gas and lightly polluted exhaust air. Therefore the choice of a suitable systems for the treatment of the lightly polluted but odour prone exhaust air plays a key role in MBT plants with long-term rotting. However, the system is completed by further components, such as an acid scrubber (absorption of ammonia), a dust filter and an oxidation facility for the treatment of higher-polluted streams mainly from the pre-rotting. The type of the oxidation facility (thermal, chemical, physical) and the exhaust gas quantity from the pre-rotting that has to be treated have to be adapted to the chosen process concept and fixed in each individual case.