

## Requirements for High Quality Recovery in German Waste Legislation

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The centre of German waste legislation is formed by the so-called Kreislaufwirtschaftsgesetz, (ff. abbrev. KrWG) translating approximately to *cycle waste management act*.

This new legal provision is to implement the Waste Framework Directive (WFD)<sup>1</sup> and one of his main features – the European waste hierarchy – into German law. The criterion of high quality recovery or rather the priority of high quality recovery is to be found in § 8 III S. 3 KrWG and mirrors § 5 II S. 3 of the former cycle waste management and waste act (Kreislaufwirtschafts- und Abfallgesetz ff. abbrev. KrW-/AbfG). § 8 III S. 3 KrWG states:

*Bei der Ausgestaltung der (...) Verwertungsmaßnahme ist eine den Schutz von Mensch und Umwelt am besten gewährleistende, hochwertige Verwertung anzustreben.*

This translates to:

*While executing a recovery operation one should aim for high quality recovery ensuring protection for mankind and environment.*

Even though the new wording seems closely related to the previous codification – according to the explanatory memorandum (Gesetzesbegründung) – the dictate of high quality is to become a binding statutory duty. Further, § 8 II KrWG contains the power to issue statutory instruments for the Federal Government (Bundesregierung) to set requirements for high quality. In its statement during the legislative procedure for the KrWG Federal Council (Bundesrat) criticized that Federal Government is not *obliged* to exercise its power to issue a statutory ordinance to substantiate what constitutes high quality recovery. Bundesrat opted for:

<sup>1</sup> Directive 2008/98/EC.

<sup>2</sup> In accordance with the usage in German law in the following sections are marked with the sign §, paragraphs are marked with Latin letters (I, II, etc.) followed by sentences (S.) and/or if needed by numbers (Nr.).

*Die Bundesregierung bestimmt nach Anhörung der beteiligten Kreise (§ 68) durch Rechtsverordnung mit Zustimmung des Bundesrates für bestimmte Abfallarten auf Grund der in § 6 Absatz 2 Satz 2 und 3 festgelegten Kriterien*

1. den Vorrang oder Gleichrang einer Verwertungsmaßnahme und
2. Anforderungen an die Hochwertigkeit der Verwertung.<sup>3</sup>

Bundesrat saw the need for an obligation to substantiate the rank order of recovery operations and requirements for its high quality due to its complexity. Experience under the previous waste legislation proved Federal Government should not have discretionary authority whether to issue a statutory ordinance or not. For the most common types of waste Bundesrat saw the necessity for a regulation at federal level in order to create legal certainty and to prevent waste tourism. Nevertheless, Federal Government dismissed these objections saying § 8 KrWG is adequately substantiated and executable without an ordinance. Whether this point of view is appropriate is to be examined in the following.

Since 1989 Federal Government failed to issue an ordinance to substantiate the requirements for high quality recovery based on § 13 IV S. 3 linked to § 7 I KrWG-/AbfG. Moreover no ordinance to regulate the requirements for the priority of material or energy recovery had been issued based on § 6 I KrWG-/AbfG. The previous phrasing in regard to high quality recovery in § 5 II S. 3 KrWG-/AbfG:

*Eine der Art und Beschaffenheit des Abfalls entsprechende hochwertige Verwertung ist anzustreben*

was seen as a (non-binding) plea for high quality without setting any criteria for its implementation in individual cases. Even though § 8 KrWG aims to dictate high quality recovery, one can challenge its binding quality. It is to assume high quality recovery still remains a plea hard to enforce.

## 1. The dictate of high quality recovery

In order to understand the regulatory content of high quality recovery one has to examine (1) what constitutes high quality recovery and (2) how a dictate of high quality can be substantiated and thus can become enforceable.

### 1.1. High quality of recovering operations according to § 5 II S. 3 KrWG-/AbfG

#### 1.1.1. Legal construct and terminological clarification

The criterion of high quality according to § 5 II S. 3 KrWG-/AbfG is made of two unspecific legal terms. For instance there is no definition of the term *high quality recovery*. Further, as according to the legal wording one should aim for high quality recovery, it is unclear what it means *to aim for high quality*. In lack of a proper definition, the German commentary literature uses the other so-called *Grundpflichten* (principle duties) of German waste legislation of § 5 II S. 3 KrWG-/AbfG as interpretative basis. One of these principles is the *Getrennthaltungsgebot* – the dictate of source separation – in § 5 II S. 4 KrW-/AbfG:

*Soweit dies zur Erfüllung der Anforderungen nach §§ 4 und 5 erforderlich ist, sind Abfälle zur Verwertung getrennt zu halten und zu behandeln.*

<sup>3</sup> Compare BR-Drucks. 216/11, 27.05.2011, p. 8.

Moreover, § 5 III KrW-/AbfG stated that recovery has to be *ordnungsgemäß* and *schadlos*, meaning in accordance with the law codified in waste legislation and other ordinances of administrative law, and it has to be harmless. To substantiate these general legal terms commentaries<sup>4</sup> used to fall back on § 13 IV S. 3 combined with § 7 I KrW-/AbfG and the aspect of technical and economic feasibility (§ 5 IV till VI KrW-/AbfG).

### High quality material recovery

As laid down in the explanatory framework for the first draft<sup>5</sup> of § 5 II S. 3 KrW-/AbfG, the criterion of high quality was intended as a counter measure against so-called *downcycling*. Downcycling means progressive aggravation of materials over time and the life-cycle of its use.<sup>6</sup> Therefore materials should be used close to its original intend. According to the explanatory memorandum the dictate of high quality recovery should only apply to material recovery.<sup>7</sup> Some legal literature argued it applies also to energy recovery,<sup>8</sup> as the criterion for high quality recovery complements the rather insufficient differentiation of material and energy use.<sup>9</sup> A positive definition of high quality material recovery could be the prevention of the accumulation of harmful substances in the environment through recycled material. The recycling product should be equal to the basic product in terms of contaminant content. Thus, high quality recovery would constitute a recovery in consideration of its demand for energy, the prevention of the accumulation of contaminants and in observance of the natural resource economy intended by law.<sup>10</sup>

As high quality recovery was linked to the kind and the state of the waste, according to *Frenz* the criterion of high quality related to the waste itself and its material characteristics and not to the intended use.<sup>11</sup> Thus, recovery in regard to the kind and state of the waste is only high quality, if it is on a high ecological level.<sup>12</sup> The criterion of high quality is a quality characteristic of the recovery operation itself and does not relate to the choice between different kinds of recovery. Further, § 5 II KrW-/AbfG does not contain a scale of values of recovery operations.<sup>13</sup>

In § 6 I S. 2 and 3, and § 6 II KrW-/AbfG there is only the criterion of environmental compatibility for the differentiation and for the regulation of the priority of material over energy recovery. The criterion of high quality does not apply to differentiate material recovery and energy recovery; it calls for the evaluation of different recovery operations in one kind of recovery (either material or energy).<sup>14</sup>

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<sup>4</sup> *L.-A. Versteyl*, NdsVBl. 2001, p. 25 (25).

<sup>5</sup> BT-Drucks. 12/7284, p. 14.

<sup>6</sup> *Kunig*, in: *Kunig./Paetow/Versteyl*, KrW-/AbfG, § 5 Rn. 13: *fortschreitenden Verschlechterung der Verwendungsprodukte mit zunehmender Dauer des Verwendungskreislaufs*.

<sup>7</sup> This opinion can be found in: *Fluck*, in: *Fluck* KrW-/AbfG, § 5 Rn. 107.

<sup>8</sup> See e.g. *Kunig*, in: *Kunig./Paetow/Versteyl*, KrW-/AbfG, § 5 Rn. 13 ff.; *Weidemann*, in: *Brandt/Ruchay/Weidemann*, KrW-/AbfG, § 5 Rn. 48 ff.; *Frenz*, KrW-/AbfG, 3. Aufl. 2002, § 5 Rn. 16 ff.

<sup>9</sup> *Weidemann*, in: *Brandt/Ruchay/Weidemann*, KrW-/AbfG, § 5 Rn. 48.

<sup>10</sup> Compare *von Lersner*, in: *Hösel/von Lersner/Wendenburg*, *Recht der Abfallbeseitigung*, Bd. I, § 5 Rn. 7; *Weidemann*, in: *Brandt/Ruchay/Weidemann*, KrW-/AbfG, § 5 Rn. 48.

<sup>11</sup> *Frenz*, KrW-/AbfG, 3. Aufl. 2002, § 5 Rn. 23: *nur auf den Abfall selbst und damit auf seine stofflichen Eigenschaften bezogen und nicht auch an den mit dem Abfall verfolgten Verwendungszweck*.

<sup>12</sup> Compare explanatory memorandum, BT-Drucks. 12/5672, S. 41; *Frenz*, KrW-/AbfG, 3. Aufl. 2002, § 5 Rn. 25

<sup>13</sup> *Fluck*, in: *Fluck*, KrW-/AbfG, § 5 Rn. 107.

<sup>14</sup> *Fluck*, in: *Fluck*, KrW-/AbfG, § 5 Rn. 107.

### Permissibility of energy recovery = high quality energy recovery?

In commentaries one could find the opinion that energy recovery in accordance with the provisions in §§ 6 II, 4 IV KrW-/AbfG is high quality per definition.<sup>15</sup> According to § 6 II KrW-/AbfG energy recovery is only permissible, if the calorific value without mixing materials equals at least 1,100 kJ/kg.

*(...) der Heizwert des einzelnen Abfalls, ohne Vermischung mit anderen Stoffen, mindestens 11.000 kJ/kg beträgt.*

The criterion of calorific value in § 6 II Nr. 1 KrW-/AbfG has been understood as a minimum requirement for energy recovery until the rulings by the European Court of Justice.<sup>16</sup> This minimum requirement was supplemented by combustion efficiency of at least 75 % in § 6 II Nr. 2, plus the dictate of thermal use in Nr. 3 and complemented by the requirement that the waste output of the recovery should be easy to dispose of is Nr. 4. All these criteria met equaled high quality recovery. The Waste Framework Directive replaced the criterion for combustion efficiency with the R1-formula. This criterion is met by almost all community refuse incinerators in Germany; the additional dictate of thermal use is met by 2/3 (ca. 42). As objective – and not as a binding dictate – the criterion of § 6 II S. 2 Nr. 4 KrW-/AbfG in regard to cinder and filter dust of the incineration does not need to be considered. Thus, the remaining criterion to evaluate high quality energy recovery was – until the decision by the ECJ – the minimum calorific value of 11,000 kJ/kg.

### Technical feasibility and economic reasonability

Undoubtedly, the criterion of high quality is the result of a close examination and comparative evaluation of different possible recovery operations in one kind of recovery. Reasonability and feasibility need to be considered.

The caveat of technical and economic feasibility means a certain recovery operation is not mandatory, when it is applicable.<sup>17</sup> The technical feasibility is not based on *best available techniques*, but requires practicability and not a mere theoretic and speculative possibility.<sup>18</sup> Merchantability is not a requirement for economic feasibility, but an example for it. On the other hand – already derivable from the German Basic Law (the German constitution) and its dictate of proportionality – the production of non-marketable recycling goods cannot be requested.<sup>19</sup> It suffices a market can be created. A market constitutes of supply and at least the demand by two consumers. For significant mass fluxes, e.g. mineral construction rubble, cinder, railway ballast etc. German legislative authority is going to regulate and limit recovery in a general legal framework (Ersatzbaustoffverordnung). This is consistent with an ecological point of view, as there should be no lesser requirements for material recovery than there are for landfilling and energy recovery.

### Aim for high quality

To fathom the message of the term *high quality recovery*, one needs to know what it means to *aim* for it and whether the dictate of high quality recovery has any binding force. There has

<sup>15</sup> Weidemann, in: Brandt/Ruchay/Weidemann, KrW-/AbfG, § 5 Rn. 48.

<sup>16</sup> ECJ, ruling of 13.02.2003, Rs. C-228/00 (Belgian cement); ruling of 13.02.2003, Rs. C-458/00 (Luxembourg municipal waste).

<sup>17</sup> Kunig, in: Kunig/Paetow/Versteyl, KrW-/AbfG, § 5 Rn. 29.

<sup>18</sup> Kunig, in: Kunig/Paetow/Versteyl, KrW-/AbfG, § 5 Rn. 31 und 32.

<sup>19</sup> Vgl. Beckmann, DVBl. 1995, S. 313 ff.; Kunig, in: Kunig/Paetow/Versteyl, § 5 Rn. 31 m. w. N., sowie Rn. 36.

been no consensus in commentary literature. The majority assumed it was no enforceable legal duty.<sup>20</sup> Others said enforceability is at least possible.<sup>21</sup> Experience nevertheless showed the dictate of high quality recovery had no significance whatsoever. The phrasing found in previous legislation proves the dictate of high quality aims for optimization and nothing more. This viewpoint does not change regarding the system behind waste legislation and the position of this dictate as one of its basic principles.<sup>22</sup> Therefore the plurality of voices in literature saw the dictate of high quality simply demanding to make an effort and thus having solely programmatic character.<sup>23</sup> Just the open refusal of a technically feasible and economically reasonable recovery operation was seen as impermissible and as a violation of law.<sup>24</sup> The onus of proof was at the expense of government agencies which had to prove whether a recovery operation was mandatory based on § 5 II S. 3 KrW-/AbfG.<sup>25</sup>

### 1.1.2. Enforceability of high quality recovery

Even though it was tried to substantiate the dictate of high quality recovery it was still not enforceable. For this the consideration of so much data would have been necessary that a final evaluation was impossible for waste producers or waste holders and it is therefore reserved to authority having the power to issue statutory instruments.<sup>26</sup> There should be consensus that substantiation through statutory ordinance and the enforceability of the dictate of high quality material and energy recovery are merely plausible based on life-cycle assessment (eco-balancing).

## 1.2. High quality recovery according to § 8 I S. 3 KrWG

Implementing Art. 4 Waste Framework Directive § 4 KrWG contains the five-step waste hierarchy. On top stands waste prevention, the last step is formed by disposal. In between are on the second step *preparing for re-use*, on the third *recycling* and on the fourth *other recovery e.g. energy recovery*. In § 8 KrWG this five-step system becomes a basic principle for waste producers and waste holders. This codifies which kind of recovery operation in accordance with § 6 I KrWG shall be executed in an individual case.

§ 8 I S. 1 KrWG states the priority of recovery operation in regard to kind and state of the waste best ensuring the protection of mankind and environment and considering the criteria of § 6 II S. 2 and S. 3 KrWG. These criteria are similar to those in § 5 V KrW-/AbfG for there are: expected emissions, natural resource protection, sufficient energy input, the accumulation of pollutants and technical and economical feasibility.

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<sup>20</sup> See the dispute in the commentary by *Frenz*, KrW-/AbfG, 3. Aufl. 2002, § 5 Rn. 29-34; *L.-A. Versteyl*, NdsVBl. 2001, p. 25 (26).

<sup>21</sup> *von Lersner*, in: Hösel/von Lersner/Wendenburg, Recht der Abfallbeseitigung, Bd. I, § 5 Rn. 7

<sup>22</sup> A. A. *L.-A. Versteyl*, NdsVBl. 2001, S. 25 (27), so auch *von Lersner*, in: Hösel/von Lersner/Wendenburg, Recht der Abfallbeseitigung, Bd. I, § 5 Rn. 7; *Rebentisch*, NVwZ 1997, S. 417 (420); mit umfassender Darstellung *Kunig*, in: *ders./Paetow/Versteyl*, KrW-/AbfG, § 5 Rn. 14.

<sup>23</sup> *Kunig*, in: *Kunig/Paetow/Versteyl*, KrW-/AbfG, § 5 Rn. 14.

<sup>24</sup> Compare *Fouquet/Mahrwald*, Die Hochwertigkeit der Verwertung nach dem KrW-/AbfG, NuR 1999, p. 144 (147).

<sup>25</sup> *L.-A. Versteyl*, NdsVBl. 2001, S. 25 (29).

<sup>26</sup> Vgl. *Fluck*, in: *Fluck*, KrW-/AbfG, § 5 Rn. 116.

The dictate of high quality recovery can be found in § 8 I KrWG:

*(1) Bei der Erfüllung der Verwertungspflicht nach § 7 Absatz 2 Satz 1 hat diejenige der in § 6 Absatz 1 Nummer 2 bis 4 genannten Verwertungsmaßnahmen Vorrang, die den Schutz von Mensch und Umwelt nach der Art und Beschaffenheit des Abfalls unter Berücksichtigung der in § 6 Absatz 2 Satz 2 und 3 festgelegten Kriterien am besten gewährleistet. Zwischen mehreren gleichrangigen Verwertungsmaßnahmen besteht ein Wahlrecht des Erzeugers oder Besitzers von Abfällen. Bei der Ausgestaltung der nach Satz 1 oder 2 durchzuführenden Verwertungsmaßnahme ist eine den Schutz von Mensch und Umwelt am besten gewährleistende, hochwertige Verwertung anzustreben. § 7 Absatz 4 findet auf die Sätze 1 bis 3 entsprechende Anwendung.*

For the technical implementation of a recovery operation according to § 8 I S. 1 or S. 2 one has to aim for that kind of high quality ensuring protection for mankind and environment. Is this a violation of proper implementation of the Waste Framework Directive?

Art. 11 I Waste Framework Directive states in context with the use of economic instruments, procurement criteria, quantitative objectives or other measures:

*Member States shall take measures to promote high quality recycling and, to this end, shall set up separate collections of waste where technically, environmentally and economically practicable and appropriate to meet the necessary quality standards for the relevant recycling sectors.*

This phrasing shows that the criterion of high quality only applies to recycling and not to energy recovery. Furthermore, Art. 11 Waste Framework Directive does not include any requirements going beyond existing German legislation. The basic principles in § 5 KrW-/AbfG already codified these requirements and thus, KrW-/AbfG was in accordance with the Directive in regard to high quality recovery already. § 9 KrWG (*Getrennthaltung von Abfällen zur Verwertung, Vermischungsverbot*: source separation and mixing ban) even extends these requirements:

*(1) Soweit dies zur Erfüllung der Anforderungen nach den § 7 Absatz 2 bis 4 und § 8 Absatz 1 erforderlich ist, sind Abfälle getrennt zu halten und zu behandeln.*

*(2) Die Vermischung, einschließlich der Verdünnung, gefährlicher Abfälle mit anderen gefährlichen Abfällen oder mit anderen Abfällen, Stoffen oder Materialien ist unzulässig. Abweichend von Satz 1 ist eine Vermischung ausnahmsweise dann zulässig, wenn*

*1. sie in einer nach diesem Gesetz oder nach dem Bundes-Immissionsschutzgesetz hierfür zugelassenen Anlage erfolgt,*

*2. die Anforderungen an eine ordnungsgemäße und schadlose Verwertung nach § 7 Absatz 3 eingehalten und schädliche Auswirkungen der Abfallbewirtschaftung auf Mensch und Umwelt durch die Vermischung nicht verstärkt werden sowie*

*3. das Vermischungsverfahren dem Stand der Technik entspricht.*

*Soweit gefährliche Abfälle in unzulässiger Weise vermischt worden sind, sind diese zu trennen, soweit dies erforderlich ist, um eine ordnungsgemäße und schadlose Verwertung nach § 7 Absatz 3 sicherzustellen, und die Trennung technisch möglich und wirtschaftlich zumutbar*

The system of five steps in the European waste hierarchy of Art. 4 Waste Framework Directive is made more flexible based on the protection of mankind and the environment in § 8 I S. 1 KrWG. The system is further relativised by the possibility of choice between equally good recovery operations in paragraph I S. 2. This is where criticism from the European Commission during the notification was headed. According to the European Commission, this does not mirror the waste hierarchy and its system of priorities effectively.<sup>27</sup>

<sup>27</sup> Statement 303 of the European Commission - SG(2011) D/51545 in regard to Directive 98/34/EG, notification: 2011/0148/D.

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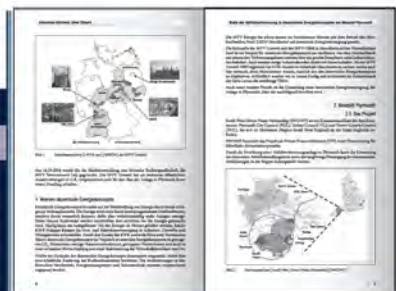
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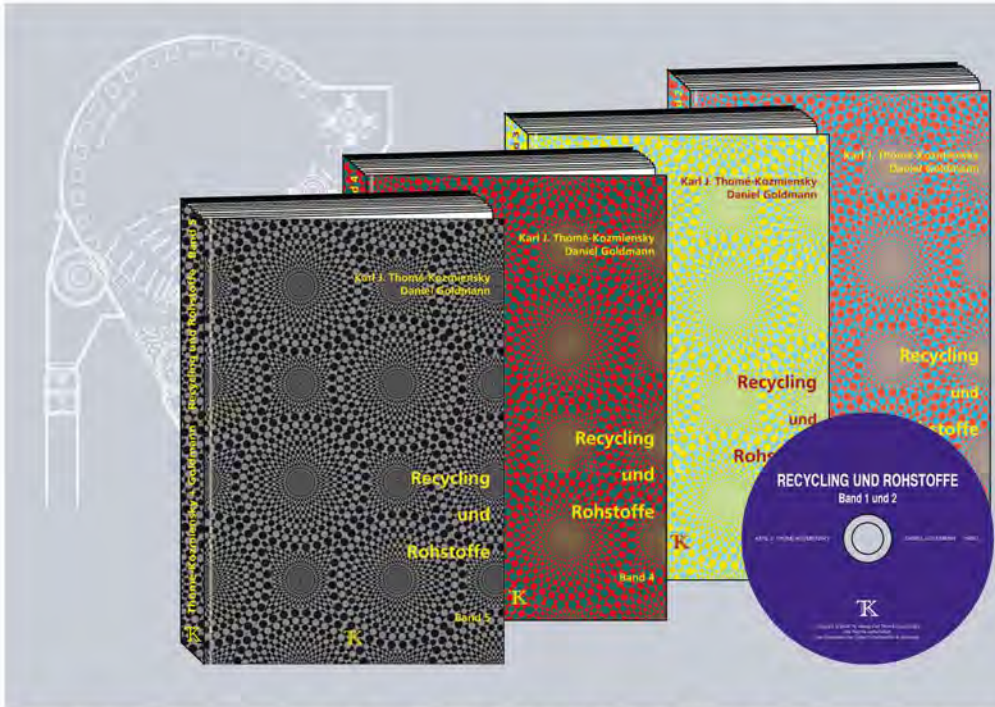
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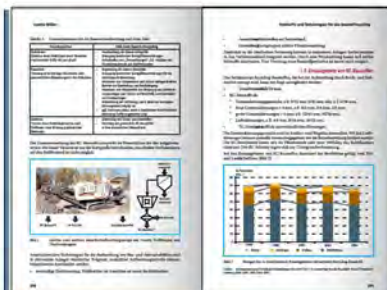
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The European Commission passes no criticism on the criterion of high quality. German waste legislation in KrWG goes beyond the Waste Framework Directive as it mandates high quality for every kind of recovery. As a result, there is no need for further discussion on whether high quality applies to recycling only. Besides § 8 II KrWG codifies the power to issue statutory instruments for Federal Government.

### Terminological clarification

As stated above the phrasing of § 8 I S. 3 KrWG is close to § 5 II S. 3 KrW-/AbfG. § 8 does not demand for more than aiming at high quality recovery. For a link of high quality recovery to the kind and state of waste there is a cross reference to paragraph I S. 1. The point of view making the criterion of high quality a quality characteristic of the recovery operation itself can be found in the explanatory memorandum.<sup>28</sup> As the criterion of high quality only applies to the technical execution of the recovery operation, it does not relate to the choice between different kinds of recovery. The addition of the dictate to protect mankind and the environment is mere substantiation of what was meant with harmlessness of recovery in § 5 III S. 3 combined with § 7 III S. 1 KrW-/AbfG. In combination with the provision for economic and technical feasibility in § 7 IV KrWG, all this can be taken into consideration when it comes to what constitutes high quality recovery now. Moreover, there still is the inclusion of the calorific value of 11,000 kJ/kg leveling the intended order of priority positioning material recovery over energy recovery. This was also criticized by the European Commission. For the Commission this opens the door for energy recovery of paper as paper has a very high calorific value even if material recovery is far more resource efficient. This example points out the European Commission is right.

There is a market for source separated mass fluxes – like waste paper. So energy recovery is insignificant. Questions of doubt in regard to the requirements for high quality recovery only arise when it comes to smaller mass fluxes, like polluted plastics. At this point one comes to the question, whether further optional recovery operations in regard to their input (e.g. energy) are reasonable on an economical level. If high quality does not apply to the choice between different kinds of recovery operations and therefore is no criterion to differentiate material or energy recovery, the calorific value will remain problematic. If this criterion remains an indicator for the equivalence of energy recovery and material recovery, it is no indicator for high quality recovery. As stated in the explanatory memorandum:

*Soweit verordnungsrechtliche Vorgaben nicht bestehen, verlangt das Gesetz von den Erzeugern und Besitzern [von Abfällen] im Einzelfall keine strikte Durchführung der hochwertigsten Verwertungsoption, sondern eine Optimierung der Verwertung. Offensichtlich „niederwertige“ Verwertungen sind danach unzulässig.*

high quality recovery demands for optimization but it does not mandate strict compliance when it comes to recovery operations. In regard of this dictate of optimization and in order to protect material recovery from competing low quality energy recovery operations the calorific value should increase efficiency for energy recovery itself. As a result of this the explanatory memorandum argues that the criterion of the calorific value is indeed an aspect high quality recovery abnegating it elsewhere in the same memorandum.

Furthermore, the legislative authority sees a binding statutory duty in the dictate of high quality. In regard to experience with previous legislation this remains doubtful. The dictate of high quality recovery as a dictate of optimization, under which only low quality recovery is impermissible, contains more or less the same as did § 5 II S. 3 KrW-/AbfG. Even though

<sup>28</sup> Explanatory memorandum of the first draft, p. 187.

the calorific value and thus the differentiation of material and energy recovery seem to be enforceable even without further substantiation, this does not apply to the definition of what constitutes high quality recovery. Perhaps the dictate of source separation and the mixing ban can be seen as executable. The waste industry desperately needs a statutory ordinance for proper and high quality recovery.

## 2. Substantiation through statutory ordinance

In order to substantiate the dictate of high quality in a statutory ordinance one can think of two modalities. Either one can administer it in regard to mass fluxes, or in regard to facilities. In its rulings *Belgian cement* and *Luxembourg municipal waste*, the ECJ<sup>29</sup> has differentiated recovery and disposal based on the criterion of primary purpose in regard to the facility.<sup>30</sup>

For the determination of what constitutes high quality recovery it is necessary to consider mass flux and facility criteria. For different mass fluxes eco-balances have been developed. The federal association *Sekundärrohstoffe und Entsorgung (BVSE)* proposed a dictate of preconditioning for all major mass fluxes stating that solid recovered fuel or disposal shall only be allowed if further recycling is unreasonable. It might be to the best advantage to translate the caveat that the cost of recovery needs to be feasible in regard to disposal to the differentiation between material and energy recovery. For edge cases one must consider ecology, technology and economy. Restricting energy recovery with a calorific value does not result automatically in high quality material recovery.

## 3. Enforceability without statutory ordinance?

As there is yet no statutory to substantiate high quality recovery one has to ask whether there are other ways to enforce high quality recovery. One could think about reversing the onus of proof at the expense of the waste producers and the waste holders but this would not make high quality recovery more enforceable, because waste producers or waste holders would have to prove each time in individual cases that the executed recovery operation is of high quality. Instead of a burden of proof in individual cases one could think about a facility-based technical control board (*anlagenbezogener Hochwertigkeits-TÜV*). Apart from the legislative procedure for the KrWG, an initiative for a guideline 3925 by the German association of engineers (VDI) analyses the evaluation of eco-balances. These could help substantiate the criterion of high quality.

## 4. Conclusion

It will take a statutory ordinance for the duty of high quality recovery to become enforceable. In order to accomplish the goals of sustainability, resource efficiency and harmlessness of recovery for the substantiation of high quality recovery and also for the differentiation of material and energy recovery in compliance with European law and the European waste hierarchy a mass flux- based life-cycle assessment (eco-balancing) is needed.

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<sup>29</sup> See footnote 16.

<sup>30</sup> The use of waste in a Belgian cement plant constituted energy recovery because as solid recovered fuel the waste replaced primary combustibles. The incineration of waste in a waste incinerating plant in Strasbourg constituted waste disposal as heat recovery was only a side effect.