

# Seminar on Road Pavement Recycling

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Title Environmental Advantages of Recycling

## **Introduction (sheet 1)**

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### Introduction

My speech is about the environmental advantages of recycling. I will give a quick overview of the subjects now going on in our division for the recycling of raw materials mainly in road base and sub base. In this paper I will give an explanation of the necessity for recycling and the aspects of sustainable and how this necessity for recycling has resulted in Dutch Policy for recycling, and how this necessity has resulted in the implementation of recycling by using a proper set of governmental instruments. I Will complete this paper with some examples of recycling in the Netherlands, and will give some insight in de recent developments and difficulties going on at the moment.

## **Why recycling (sheet 2)**

### Short term

Scarcity of space. The Netherlands is one of the most crowded countries in the world, space is now these days a rare product. Undoubtedly this is one of the main issues for the success of recycling of raw materials in our country. We also have a population that show great concern for the environment, and is not afraid to show this concern to the government. In the last decades the resistance in the Dutch society has grown against more holes due to excavation activities of raw materials and the need for more dumping sites. There are a lot of examples that for governments it is almost impossible to find suitable locations, without calling on a lot of resistance of the local population who do not fear to take a matter to court.

### Long term

The care for the recycling of raw materials is an important for bringing human activities in more balance with our surrounding area. For some people like me it is a pity to see potentially good raw building materials being dumped, while on the other hand raw materials are ever more excavated. This main route of raw building materials from an excavation site, remaining temporarily in for example a house, and ending on a dumping site is an example of moving over our problems to future generations. In the Netherlands we begin to feel this heritage of the past generations, as in the past in the Netherlands all once used materials were dumped, resulting in a lot of dumping sites. Nowadays for the expansion of villages and cities old dumping places more and more have to be removed, and the old garbage have to be dumped in a new dumping site further on probably to be removed again by future generations.

### **Dutch policy for recycling (sheet 3)**

The use of recycled raw materials in the Netherlands has been increased from 13 million tons up to 27 million tons in the last decade. Besides a less amount of dump capacity needed nowadays, a large reduction of the need of the amount of new raw materials has been achieved, as the use of secondary raw material is now 17 percent of the total use of raw building materials in the Netherlands.

This cannot be achieved without some effort. The secondary materials as we name materials made of waste has to be kept separated already at the source at the demolition site, otherwise no useful product can be made of it. The technical quality of the secondary materials is less well known, and has to be carefully studied. And raw secondary materials can contain contamination, which have to be kept within reasonable limits.

Reducing the degradation the quality is thereby very important also, as recycling should not be just a delay of the dumping of raw materials. The recycling must be reassured in the second and next phases also, so that future generations will be not in the position of dumping their garbage included the garbage we first have recycled. Only in this way a sustainable solution of the raw material waste can be achieved.

### **Instruments for recycling (sheet 4)**

The way of stimulating the recycling is different for each different secondary material. But some general factors for success can be given.

A very important one is a good cooperation between the government(s) and the business community. The business community must have to be interested in developing this new market, which is only possible with a government that creates good market conditions.

- The government and the business community have to start a consultation
- The development of the needed techniques has to be initiated by doing governmental technical development or by the sponsoring of executive business research.
- The government has to create clarity about acceptable re-use by developing technical specifications and environmental regulations for soil protection. These regulations must regulate the complete area of recycling, from the separation of garbage till the use of recycled matter is as a building material
- The promotion, knowledge transfer, and the initiation of example projects can be done by the government
- A consistent waste policy has to be implemented. Dumping taxes or even a ban for dumping recyclable materials are in most cases necessary instruments to make the recycling business profitable for business industry.

### **Examples of recycling (sheet 5)**

I would like to give you a quick overview of the main developments and difficulties of some important recycled raw materials, namely:

- Raw materials of demolition waste
- MSWI bottom ash
- Dredged material

I would like to give you an impression of the situation of recycling of these three raw materials, and an impression of the developments, as also an impression of the difficulties that we go through in the Netherlands at the moment. The first two materials are commonly used for recycling in the Netherlands. For the last one, the recycling of the dredged material, a lot of effort is now being made by the governments, but there is still a lot to do.

## **Aggregates from construction and demolition waste (sheet 6)**

In the Netherlands raw material waste coming from construction and demolition of roads and buildings are granulated, and used as a secondary raw material replacing new materials otherwise needed. With the introduction of the ban for dumping of waste from construction and demolition up to about 95% of this waste is now being recycled. The main use of the products of this waste is the use as construction materials for road sub bases replacing sand. Some research projects in the Netherlands I like to inform you about are:

- the replacement of gravel in concrete,
- the search for a more ideal (sustainable) solution,
- how to overcome the treat of asbestos in demolition waste for recycling

### Replacement of gravel in concrete

As living in a small, densely populated country, with a soil mainly consisting of sand, clay and peat, we have problems fulfilling our own needs for gravel and sand suitable for making concrete to build. And we want to build. We know satisfy our needs by importing building materials. But also in our neighboring countries the resistance for excavation is growing. We have done and are still doing a lot of research which show that aggregates from raw material waste are suitable for replacing gravel and sand in concrete. There is a lot of discussion for the need of raw material waste in concrete, and a lot of resistance against this measurement. important is also to realize that the economic forces for making concrete in this way are missing at the moment. But that can become different in the future by the market or for political reasons as the resistance for excavating gravel and sand becoming bigger and bigger. We have to be prepared for this scenario. For this reason technical studies are know achieved and standards are developed, which facilitate the making of concrete with secondary materials, creating a more sustainable situation in which the raw waste materials are recycled in the original products.

### The search for a more ideal (sustainable) solution

The ideal situation would be a complete sustainable situation in which al raw waste materials are recycled in the original products. A situation that no new building material is needed, and raw material waste is recycled as the original product. A project started in the Netherlands for this purpose is "Kringbouw". In this project aims the development of a thermal technology to split all raw material waste in the original components, to make again concrete, mortared bricks and cement out of waste, possible to reuse again and again.

### Asbestos in demolition waste

Asbestos is a main threat for a repeated recycling of raw material from demolition waste, as in a large amount of the millions of tons of recycled raw building materials in road bases in the Netherlands asbestos is probably present. Asbestos has shown to be a dangerous material. We have to deal with the asbestos problem as otherwise the recycling of raw material waste is seriously threatened, and this recycling has been no more then just the expel of dumping. We hope to start a test next year that can separate asbestos from the secondary raw material by optical manners.

### **MSWI Bottom ash (sheet 7)**

In the Netherlands most of our household waste is burned in large combustion furnaces. After burning the household waste about 25 percent of the original mass remains as a residue. The most biggest part of this residue is the MSWI bottom ash. In the Netherlands this is about one million tons, which is successfully recycled as road sub base material.

Recently the recycling of MSWI bottom ash is seriously threatened. MSWI bottom ash is known to emit calcium, but no one has been worried about this calcium emission till recently. MSWI bottom ash in the Netherlands can in most cases only be recycled by isolating from its surrounding with bentonite, which is a kind of clay. A recent study has suggested that the calcium emitted by the bottom ash can be seriously damage the isolation capacity of the clay during the lifetime of the construction. A study of a bottom ash construction in highway 15, which for other reasons had to be demolished showed a really complete failure of the isolation of the bentonite layer. The combination of both studies caused some alarm. As a result the building of a big high way made with bottom ash was almost stopped by our politicians. That stopping would have been a very bad signal for the recycling in the future. We had to react quickly. We advised to make a layer of bitumen emulsion between the bottom ash and the bentonite to stop the calcium. That helped. The politicians agreed in the continuation of the building of the high way. But we are not ready with this problem, because we see the total of the recycling of the bottom ash falling down to a lower level, because constructors are avoiding risks. As lot of other bottom ash constructions are know studied and a discussion is now going on whether if calcium is really a threat. The recent studies of other works do not show any problems, for at the moment it seems that the highway 15 is the exception.

### **Applications of dredged materials (sheet 8)**

Living in a delta, we have a lot of dredged materials dredged out of our rivers and channels. As also living in a small country we have a big problem where to leave al this dredged materials. Recycling as a possible solution which is seriously being thought of. We are even thinking of the use of products of dredge as road sub base material. We have even started two projects in different highways for where about a hundred meters in each highway the sub base instead of sand has been made of dried clay made by the natural ripening of lutum-rich dredged materials. The projects seem to be successful, and we are known planning to promote this kind of recycling of dredged materials. I am convinced that this recycling can be well performed on larger scale, but I know we have a lot of resistance to overcome. The material is more difficult to work with, and sand is available in large amounts.

### **The end of my speech (sheet 9)**

I am now going to end my speech. I hope to have given you some insight in the research we are doing at the moment. Recycling is a very interesting field, and important for the long way to a possible sustainable society.