



## Waste management in Iran – an analysis and outlook

### Publication of results

as part of the project 'Identification and transfer of waste management concepts, services and products in (potential) EU candidate countries as well as emerging and developing countries with scientific support'

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## Iran – a dynamic partner in the Middle East

With an area of more than 1.5 million square kilometres and an overall population of almost 80 million inhabitants, the **Islamic Republic of Iran** is amongst the 20 largest and most populated states of the world. The **demographic structure** of Iran has a noticeably high proportion of young people – around 40% of Iranians are under the age of 25. Due to an urbanisation rate of 2%, **urbanisation** has reached a similar level to Germany; almost three quarters of the population in Iran lives in cities.

According to the World Bank definition, Iran is an "upper middle income country" and, following Saudi Arabia, the **second largest economy in the MENA region**. In 2015, the gross domestic product (GDP) was EUR 360.3 billion; the GDP growth increased from -6.6% in 2012 to 4.3% within just two years (2014). For 2017, the World Bank predicts an increase in the real GDP by 4.6%. Currently, the positive economic forecasts are faced by an **unemployment rate** of 11.7%.



Figure 1: Map of Iran; [Kelisi CC BY-SA 3.0](#)

### Momentum in Iranian waste management

In terms of both economy and politics, in 2016 Iran opened itself up to the international community. After the international economic and financial sanctions were relaxed in January 2016, the parliamentary elections in February 2016 showed that the population backed President Rouhani's path of economic transparency. Iranian waste management can also benefit

from this momentum in order to overcome the modernisation backlog of the last few years.

Here, cities such as Tehran and Isfahan, which have a relatively advanced waste management system, can serve as a benchmark for the rest of the country. **Development towards integrated waste management** combining separate waste collection and different recycling and disposal solutions, provides

→ Further information about the project, within the scope of which this study was carried out, can be found on the **project website**:

<http://wasteconcepts.cleaner-production.de/en/>

A **comprehensive country study** on waste management in Iran can be downloaded here:

<http://wasteconcepts.cleaner-production.de/en/dokumente-3.html>.

both **economic potential** for Iran, and can also contribute to **reducing critical environmental pollution and to avoid it in the future**. For this a joint effort is required from political, local and private stakeholders in Iran, as well as its international partners.

## Overview: waste management in Iran

### Waste generation

Iran generates **municipal waste of more than 20 million tonnes per year**. The average amount of municipal waste generated per capita in Iran is 240 kg per year. The highest volume of waste generation per capita is in the capital city Tehran, with 450 kg of municipal waste per person per year. At almost 70%, **organic waste** represents the largest component of Iranian municipal waste, followed by plastics (10%), paper/cardboard (8%) and metals (3%). As regards industrial waste, the **waste generation in the oil, gas and petrochemical industry** is above all a central challenge. Some of this waste is classified as hazardous.

### Collection and transport

In most urban areas, municipal waste is collected daily, or several times a day, with few exceptions. Since the 1980s, these waste collections are no longer exclusively organised by the local authorities, but increasingly by private companies. Today **private companies have a share of up to 80% in the collection of waste and subsequent transport**.

Currently **waste collection and transport are designed inefficiently and expensively**. Up to 85% of the costs for waste management are currently spent in this area.

**Informal waste collection** is officially banned in Iran, but does take place in practice. To counteract this problem, one approach is to oblige private companies to contract these informal waste collectors.

In many Iranian cities, dry recycling materials from private households are collected once a week by the private sector, under the supervision of the city "Waste Management Organizations". Furthermore, the districts of the cities also have **waste banks**, where the residents can dispose of their dry recycling materials. One motivating factor for the residents to take part in this is a points-based system whereby they can obtain household items in special shops using the points they have collected.

There are currently no institutionalised return and product responsibility systems in Iran. There are, however, isolated collection points for old electronic/electrical devices and batteries that are run privately and by the local authorities.

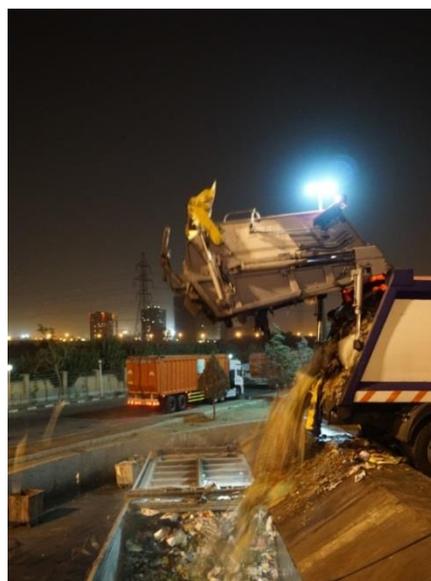


Figure 2: Transloading of waste in Tehran © adelphi

### Pre-treatment of the waste and recycling of materials

Around 20% of the municipal waste in Iran undergoes a **composting or recycling process**. The waste components for this are generally only sorted in the recycling plants. In Tehran,



Figure 3: Manual sorting for recycling in Tehran © adelphi

three groups are sorted: organic waste, materials that can be recycled and residual waste. In Isfahan, only the organic group is separated; the remaining waste is dumped.

Each Iranian city already has at least one **state-operated treatment plant and several privately operated sorting plants**. Here, the plant technology is mostly produced domestically. Frequently, individual plant components are sourced from abroad.

### Thermal use

Due to climatic and geographical conditions, above all in the north of Iran, thermal use plays an important part in the current planning processes. Between 2015-2020, the construction of **15 incineration plants** is planned for this region. The first plant was put into operation in 2015 in Tehran. With an output capacity of 3 MW, here up to 200 tonnes of solid municipal waste can be incinerated per day. This type of recycling is subsidised in Iran by **feed-in tariffs for energy gained from waste**.

However, thermal use requires upstream drying or additional combustion of oil, for example, due to the high organic component in the municipal waste. Generally, thermal use should not impair the separation of materials and the recycling of waste.



Figure 4: Model of the incineration plant in Tehran © adelphi

### Composting and use of biogas

The most common form of composting in Iran is open clamp composting with active aeration through turning. **The recycling of waste materials in biogas plants has been common in Iran since the 1970s**. In 2015 plants with an overall power of 10.5 MW were installed. Theoretically, it is possible to feed in the biogas gained in these plants, but this is not done.

Due to long-term experience in composting, many of those responsible in Iranian cities have **good specialist knowledge of organic treatment and biogas generation**. Using biogas pilot projects, assessments on biogas generation have been investigated for more than 12 years.

### Waste disposal and landfill

In 80% of Iranian provinces, **unregulated landfill sites** are used for waste disposal. The **landfill system is, however, currently undergoing a modernisation process**: between 2007 and 2016 the proportion of regulated waste dumped increased from 0.2% to 2.5%. Furthermore, in 2015 alone around 500 unregulated landfill sites were closed. The declared objective is to reduce the number of existing unregulated landfill sites – which is around 3,000 – to 600 by 2020.

Gas recovery from landfill currently plays a minor role in Iran; it is only in Shiraz and Maschhad that private companies are operating plants to recover landfill gas.

#### Kermanschah: the pioneer in Iranian waste management

The town of Kermanschah in West Iran is considered particularly attractive for the setup of a modern waste management system. Here, separation quotas are sometimes reached. These are considerably above the country average by up to 30%. As part of the Iranian-German Waste Management Conference, which was held on 25 February 2017 in Tehran, a representative of the **Recycling & Composting Kermanshah Company (RCK Co.)** explained the story of success in Kermanschah.

Back in 1998, the city agreed to the construction of a pilot plant for the recycling of organic municipal waste. A year later, RCK Co. was the first Iranian waste management company to be granted authorisation to import European waste technology. Here, they were able to import and install a compost turner, a separation drum and a shredder. RCK Co. then subsequently began informing the population of the importance of separated waste collection using publicity campaigns. In the years that followed, other plants and collection systems (biodegradable waste bins and residual waste bins) were installed step by step.



Figure 5: Composting in Kermansha © RCK Co.

Today, the waste recycling plant in Kermanschah comprises a 16 hectare site that **recycles 240,000 tonnes of waste per year**.

The presentation with other information on waste recycling in Kermanschah is available to **download** on the project website:

<http://wasteconcepts.cleaner-production.de/en/laenderaktivitaeten-3/iran-2.html>.

### The structure of Iranian waste management

The regulation of waste management in Iran is organised hierarchically. The most important national stakeholders are the ministries and the Department of Environment (DoE) and their sub-organisations. At a local level, the local authorities and waste management organisations (SWMOs) are the most important stakeholders. The following graphic provides an overview of the most important stakeholders and their responsibilities.

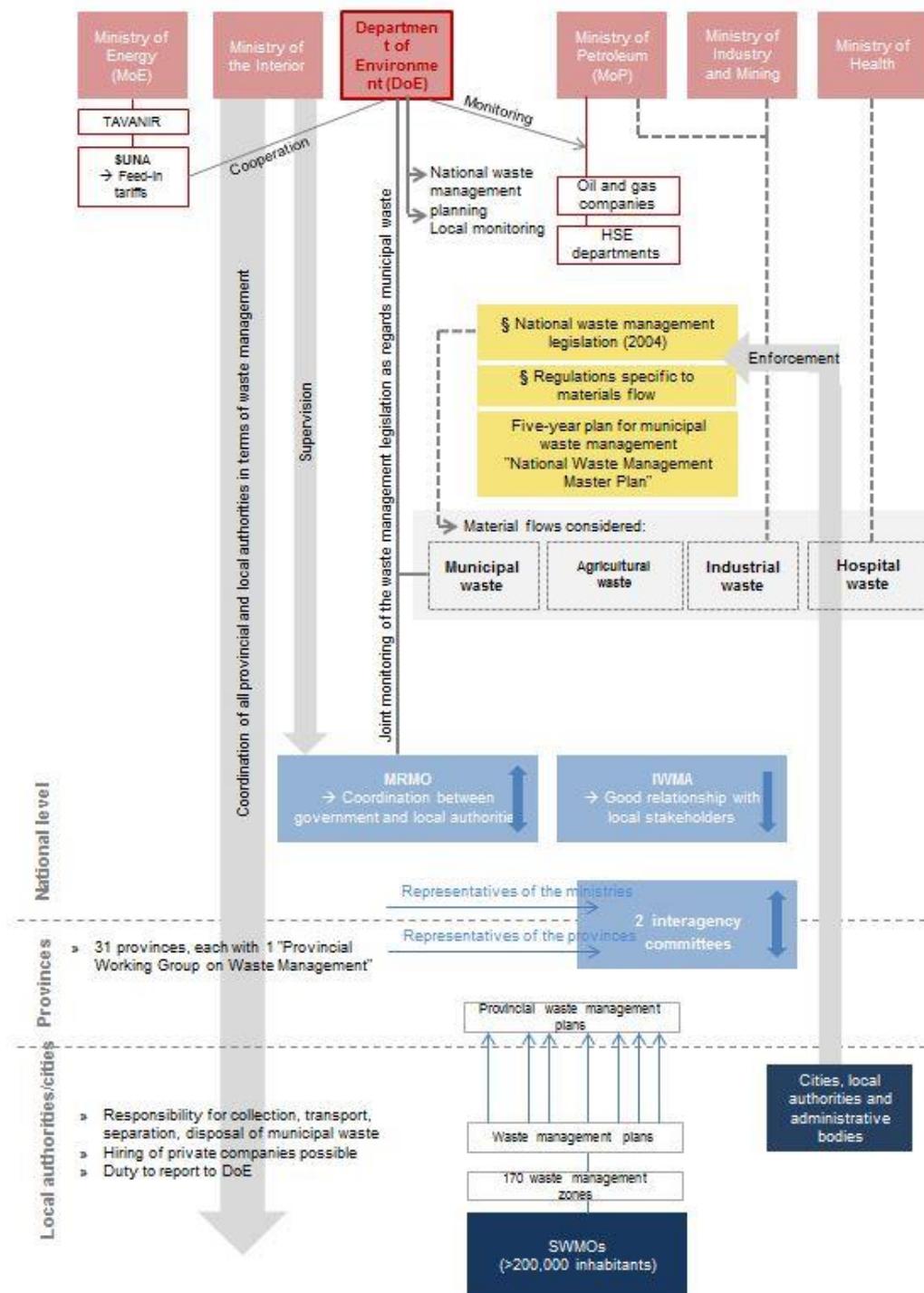


Figure 6: The structure of Iranian waste management © adelphi

## The challenges of Iranian waste management

The **central challenges** of Iranian waste management currently lie in the effective implementation of legislation regarding waste and environmental policy, the treatment of organic municipal waste and industrial waste (some of which is hazardous), as well as in the resolution of the conflict of objectives between high material recycling quotas on the one hand, and a high thermal value for thermal waste treatment on the other. With regard to the international transfer of technology and expertise, restricted international payment transactions are currently the greatest hurdle.

The national waste management legislation that was passed in 2004 is currently being revised and it remains to be seen what focal areas it will provide for waste management legislation. In addition to the content-based revision, a central challenge lies in the **implementation of the primary legislation**. This

### Focus: industrial waste

Representatives from the Iranian waste management industry have once again named the handling of (hazardous) industrial waste as the central challenge of Iranian waste management. This waste is primarily generated in the oil, gas and petrochemical industry.

In Iran there are currently hardly any treatment capacities for such hazardous waste. There are no chemical/physical treatment plants or a special waste rotary kiln in Iran; there is also no special waste intermediate storage facility for export in accordance with the Basel Convention. There is only a special waste site in Mahshahr. Its capacity and technical equipment are considered insufficient, however.

In addition to the treatment capacities, there is also a lack of technical expertise in dealing with (hazardous) industrial waste. There is currently no professional service provider in Iran that is specialised in treating special waste.

is currently made more difficult by both financial and personnel shortfalls, as well as by insufficient expertise in waste management in the responsible authorities.

In addition to the expertise of political decision makers, **appreciation of the problem by the Iranian population** regarding the significance of sustainable waste management structures, including avoiding waste, is key to modernising waste management. This applies in particular with regard to the **comprehensive introduction of separated collection systems** for municipal waste. An increase in the current quotas is an important requirement for the expansion of downstream recycling and disposal stages.

In addition to separated collection systems for municipal waste, in Iran there is great potential for the introduction of **deposit systems**, as well as **return and product responsibility systems for electronic/electrical waste and used vehicles**. The waste generated in these material flows continually increases due to **changing consumption patterns**. Currently, this topic is not a particular priority on the Iranian side.

As regards the **recycling** of materials such as paper/cardboard, plastic, glass etc., Iran is faced by the task of solving the **conflict of objectives** between high material recycling quotas on the one hand, and a high thermal value for incineration on the other.

In the next few years, **landfill** will remain the focal point of waste disposal. There are challenges in the closing and decontamination of existing unregulated landfills, as well as in the construction of new regulated landfill sites. The construction of new landfill sites is also considered with a view to the **disposal problems of hospital waste** and as **disposal sites for ash residue** from the planned incineration plants.

The involvement of foreign investors is currently hindered by **hurdles in payment transactions** as only a few international banks permit transfers in and out of Iran.

## Courses of action for further development of the Iranian waste management system

There are numerous links for modernising Iranian waste management. The corresponding recommendations for action refer to both the political/institutional structures and framework conditions, as well as treatment and disposal capacities.

The following measures can contribute considerably to establishing a sustainable and integrated waste management system in Iran:

- Training measures and **consultation and further education programmes** at national and local level can contribute to an increase in capacity in the authorities concerned.
- Implementation of comprehensive **separated collection of organic municipal waste** as a prerequisite for the recycling of materials and composting
- Based on existing pick-up and delivery systems (such as in Isfahan), these approaches could be expanded across the country to increase the quota of separated waste collection
- Targeted state media campaigns with the aim of informing citizens could improve material recycling quotas
- Introduction of **product responsibility systems** to promote resource efficiency, above all for the following material flows: used cars, packaging waste, electronic/electrical waste
- Use of waste as a **substitute fuel in cement works**; this option is currently being discussed by Iranian decision makers. This should not impair the material recycling of waste, however, which would be preferable to thermal use
- Alignment with quality assurance systems for composting and fermentation processes
- Construction of systems for **landfill gas recovery and utilisation**
- Development and implementation of concepts for **dealing with (hazardous) industrial waste**

### What are the recommendations of...

#### ...representatives of the Iranian Department of Environment (DoE)?

- Development of legal requirements for dealing with industrial waste
- Feasibility study on treatment options for different special waste material flows
- Increasing of monitoring capabilities within the environmental authorities towards industry for the effective enforcement of waste management provisions
- Increasing of monitoring capabilities within the environmental authorities towards the informal sector to prevent the disposal of recyclable material

#### ... representatives from the Iran Waste Management Association (IWMA)?

- Development and implementation of separated collection of construction and demolition waste
- Analysis of the materials-based composition of mixed construction and demolition waste
- Development and implementation of concepts for the treatment of hospital waste
- Promotion of incineration of hospital waste in cement works, too

During the Iranian-German Waste Management Conference, the Iranian participants were provided with a questionnaire to find out which aspects, in their opinion, are particularly relevant for the future development of Iranian waste management:

More than 70% of the Iranian respondents consider the following points to be "very urgent" for the development of Iranian waste management:

- Consistent implementation of waste management legislation
- Waste management training courses and further education programmes at local level
- Waste management training courses and further education programmes at national level
- Construction of incineration plants for hospital waste
- Construction of incineration plants for hazardous waste

## Iranian-German Waste Management Conference

Tehran | Iran

25 February 2017

On 25 February 2017 a project workshop was held in Tehran with service presentations. This was embedded in a conference by the "Iran-Germany Waste Management Initiative", which was specially founded by the Iranian partners. More than 200 people took part, including representatives of Iranian and German waste management and high-ranking politicians from both sides. The event was jointly organised by the Iranian Department of Environment, the University of Tehran and adelphi. It was opened by **Dr Masoumeh Ebtekar**, Vice-President of Iran and Head of the Iranian Department of Environment, and Mr Jochen Flasbarth, State Secretary in the German Federal Ministry of the Environment.

The **agenda** and the **presentations** are available to download on the project website: <http://wasteconcepts.cleaner-production.de/en/laenderaktivitaeten-3/iran-2.html>.

## Waste management cooperation between Iran and Germany

Iran and Germany have cooperated as regards waste management issues for a long time. Around ten years ago, German experts created a preparatory study for the construction of a new landfill site in Tehran as part of the "Tehran Solid Waste Management" project for the World Bank. The "Tehran Landfill Preparation Study" consisted of a comparison of different landfill technologies as well as a draft of the landfill site, for example. The project was carried out by the German engineering company BC Berlin (see contact information below). The Iran Renewable Energy Organization (SUNA) also confirmed that German companies have already created feasibility studies in the Iranian waste sector, for example, in the field of energy recovery from waste.



Since the relaxing of the sanctions, there has also been an intensive exchange between Bavarian waste management representatives and representatives from the petrochemical industry in Iran (see contacts below). During several delegation trips in 2016, a focus was placed on the treatment and disposal of industrial waste from the oil industry.

The **Iran-Germany Waste Management Conference**, which took place on 25 February 2017 in Tehran, Iran, helped to strengthen the waste management cooperation between Iran and Germany and to set the course for future cooperations. During the conference, the Iranian participants were asked for their assessment of future cooperation potential. Using a questionnaire, they were able to state the topics that they consider (un)suitable for cooperation with Germany. A total of 37 questionnaires were evaluated; not all of them were completed in full, however.

### Potential for the future

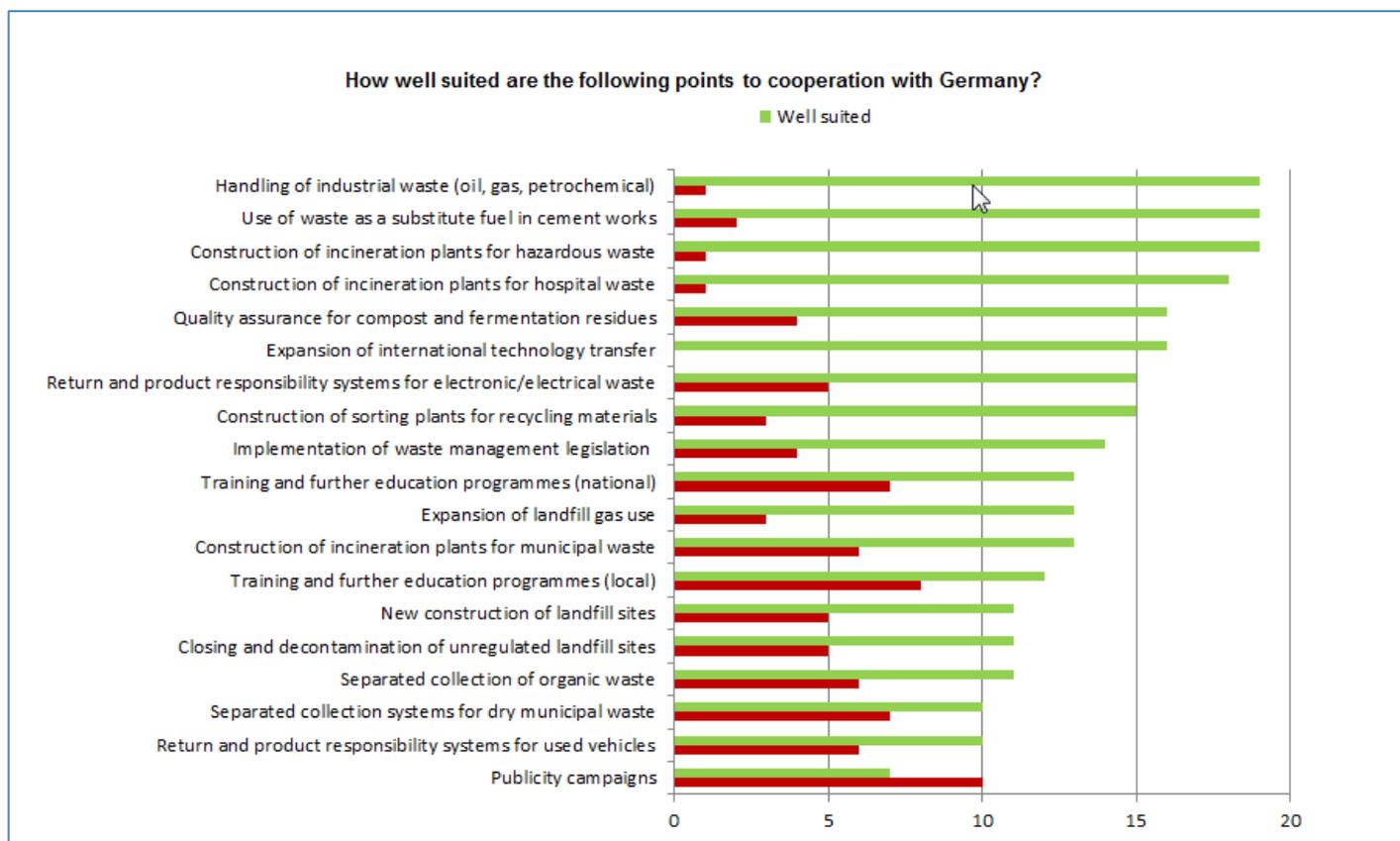
The evaluation of the questionnaires demonstrated that, generally, there is great interest in many areas in a waste management cooperation with Germany. The following areas for action were classified by *more than 50%* of the questionnaire participants as "**very well**" suited for future cooperation with Germany:

- Construction of incineration plants for hazardous waste
- Use of waste as a substitute fuel in cement works
- Treatment of waste from the oil, gas and petrochemical industry.

*Almost 50%* of the participants considered the following areas for action as "well suited":

- Quality assurance and quality criteria for compost and fermentation residues
- Construction of incineration plants for hospital waste
- Expansion of international technology transfer

The following graphic shows the results of the survey in detail:



### Cooperations following the Iranian-German Waste Management Conference

As a result of the Iranian-German Waste Management Conference, further cooperations between Iranian and German stakeholders have already taken off:

- The company **Payasyst** is organising a **delegation trip to Germany** for waste management stakeholders from **Bandar Abbas**
- **Petro Imen Sharif** and Blackforest Solutions have formed a cooperation in the field of industrial waste management.
- The **University of Tehran** and the **University of Rostock** have signed a **cooperation agreement**.

For information on other cooperation possibilities, please contact AHK in Tehran or the



Deutsch-Iranische  
Industrie- und Handelskammer  
اتاق بازرگانی و صنایع  
ایران و آلمان

AHK Iran organises delegation trips in Iran and to Germany, provides information at events in both countries regarding economic, legal and social circumstances, as well as regarding possibilities for collaboration.

**Website:** <http://iran.ahk.de/ir/>

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German RETech Partnership.



**German RETech Partnership**  
Recycling & Waste Management  
Made in Germany

Global demand for recycling and disposal technologies is high and will continue to rise. Raw materials that are becoming ever scarce and increasing environmental awareness in the emerging economies are contributing to this. The German recycling and disposal industry is excellently positioned to meet this global demand. At 25%, the international market share of German companies in this area is already considerable. However, there is still great potential for the export of German technology, concepts and services which has not yet been used. Leveraging this potential, and promoting the export of German technology, as well as knowledge transfer through collaboration of the individual stakeholders, is the primary objective of RETech. Through this, RETech and its members also play an important part in raising standards in waste management around the globe.

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#### The University of Rostock

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#### Umweltcluster Bayern

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