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# CapaCity Workshop

**Sofia, Bulgaria**

## Workshop Report

November 29th – November 30th, 2016

Sofia, Bulgaria

a format  
of



**tinavienna**  
■ smart city agency  
■ energy center

in cooperation  
with



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# 1 Introduction

## CapaCity – Urban Competences

The program **CapaCity – Urban Competences** funded and supported by the Municipal Department 27 – European Affairs of the City of Vienna pursues a more deepened international cooperation between the City of Vienna, its organizations and other cities. Several initiatives in the Danube region have already pushed forward cooperation and intensification of social and economic exchange between countries, regions and cities (f.i. the enlargement of the European Union in 2004 & 2007; the establishment of the European Strategy for the Danube Region). Nevertheless the City of Vienna now focuses on the internationalization of organizations and companies in order to generate common project ideas. Integrated urban development as holistic smart city approach is the main aspect of future activities within the program CapaCity. The Municipal Department for European Affairs (MA 27) of the City of Vienna as initiator of the CapaCity program pursues to both widen the range of topics for city cooperations and to identify core topics of common interest.

Intensified European integration is one aspect of the program. Additionally the city of Vienna has been visited by rising numbers of delegations and municipal experts, who are interested in urban strategies and technologies applied in Vienna. CapaCity will build up on opportunities generated by this grand international interest and will strive to sustain contacts and to intensify exchange with regards to urban technologies and strategies.

The following activities are designed within the project CapaCity in order to support Viennese companies and organizations to deepen internationalization and activities in CEE and SEE:

- Organization of workshops in selected cities and towns with participation of Vienna stakeholders. The main aim of these workshops is to trigger follow-up activities.
- Coordination and collection of statistics of visiting delegations and experts to Vienna organisations and companies with particular interest in Vienna's urban solutions.
- Representation at events, relevant for smart city expert networks & cooperation ideas.
- Research on and collection of relevant challenges for future urban development with regard to important cross-border and transnational projects and attractive co-financing instruments.
- Development of project ideas, triggered by municipal expert exchange on the basis of organized workshops in CapaCity partner cities.

Diverse sectors and topics are relevant for workshops within CapaCity which are based on issues of the smart city Vienna framework strategy: radical resource preservation, innovations/new technologies, balanced quality of living. CapaCity is open for a variety of concrete topics, e.g. among others integration and diversity policies, PPPs (private-public partnerships) for cities and municipalities, urban mobility and transport planning, strategies for tourism development or urban development visions. The ruling principle of

workshops is the mutual benefit for both the host city and the City of Vienna and its organizations.

The CapaCity-Workshop in Sofia, Bulgaria focused on two interwoven topics which are both new but interesting within the framework of CapaCity – Urban Competences:

- Waste incineration & district heating
- Municipal waste management

In the following chapters more background information is provided.

## 2 Executive Summary

Based on the occasion of a visit of Sofia's mayor Mrs. Jordanka Fandakova in Vienna in March 2016, fields of cooperation with respect to waste, district heating and waste as resource have been identified in her meeting with Vienna's mayor Mr. Michael Häupl.

Together with EuroComm PR GmbH, TINA Vienna picked up the chance to establish deepened cooperation and organized a workshop on waste and waste incineration plants as component in a city wide district heating network. Within the workshop from November 29<sup>th</sup> until November 30<sup>th</sup>, 2016, experts from Wien Energie and MA 48, the municipal waste management of Vienna, gave substantial input for an intensive debate on future activities in Sofia.

Sofia will build a new waste incineration plant, the first of its kind, which will feed the district heating network by utilizing RDF (refused derived fuel) produced by a municipal factory. With regard to future planning issues, the Vienna experts strongly suggest to involve WKU (Wiener Kommunal und Umweltschutzprojekt-gmbH) which currently has the necessary know-how to plan and construct a waste incineration plant. Wien Energie also commissions WKU for such purposes and recommends an intensified cooperation. Additionally the business model of collecting and processing waste in Sofia should be further analysed as these pre-settings are the basis for the plant system components to be built.

From the waste management point of view, several topics were discussed i.a.

- Design of and processes at recycling centres (waste dumps) as there are 17 of them in Vienna. Lobbying at the European Commission with respect to European legislation. The role of municipal waste management departments when it comes to recycling quotas, etc. and the actual realization of waste management directives.
- How does a city provide recycling rate statistics for waste?
- Public procurement of contractors for performing municipal services.

Due to limited time, many detailed aspects could not be discussed but offered potential for future cooperation activities. E.g. WKU could offer their services in the fields of:

- Planning and Design of recycling centres (waste dumps).
- Technical supervision of the waste incineration plant with RDF utilization.
- Framework contracting for continuous advisory works.

Additionally a project proposal together with Vienna, Sofia and other partner cities for the Horizon 2020 call „ Improving the performance of inefficient district heating networks“ EE-02-2017 is envisaged. The deadline for the call is June 7<sup>th</sup>, 2017.

For the first quarter of 2017 a follow-up workshop on certain subdomains of discussed issues is planned.

### 3 The study case & problem statement

The starting point of activities between companies and departments of the cities of Sofia and Vienna re-intensified after the occasion of a visit of Sofia's mayor Mrs. Jordanka Fandakova in Vienna in March 2016. In her meeting with Vienna's mayor Mr. Michael Häupl topics like waste management, waste incineration, management of public utilities and other environmental issues were in focus of discussion. Mayor Fandakova left Vienna by highlighting the importance of cooperation between municipalities, especially metropolises.

Together with EuroComm PR GmbH, TINA Vienna and the program CapaCity - Urban Competences took up the chance to work together on these defined topics. Three paths of future activities settled to be pursued:

- Support of WKU (Wiener Kommunal- und Umweltschutzprojektgesellschaft mbH) in order to be addressed to check the technical specifications for a waste incineration plant in Sofia capable to burn RDF (refused derived fuel), to be envisaged for procurement in 2017.
- Develop, together with other participating cities in SEE a project proposal for the Horizon 2020 Call EE-02-2017 "Improving the performance of inefficient district heating networks", in order to improve district heating networks and operations by technical and management measures.
- Organization of a workshop on the topic of integrative waste management on municipal level which addresses mainly waste management, waste separation and processing, and use of waste for a waste incineration plant for feeding the district heating network in Sofia. This workshop took place in cooperation with stakeholders from the City of Vienna.

Sofia is the capital of Bulgaria and the largest political, administrative, cultural and educational centre in the country, with a current population of 1.8 million (in the metropolitan area). Sofia's municipality is an administrative unit with the status of a region and divided into 24 districts. The municipality's main activities include: preservation of the environment, healthcare, and the organisation of social, educational and cultural activities.

The Sofia Municipal Council, a body of local self-government, is authorised to adopt strategies, forecasts, programmes and plans on local issues, including waste management. While its activities are subject to the National Waste Management Plan, this still makes the municipality a first level stakeholder in the regional environmental and waste management policy.

(Source: <http://www.regions4recycling.eu/partners/Sofia>)

## 3.1 Sofia waste management

As essential background information the following status quo in the integrative waste management in Sofia is stated.

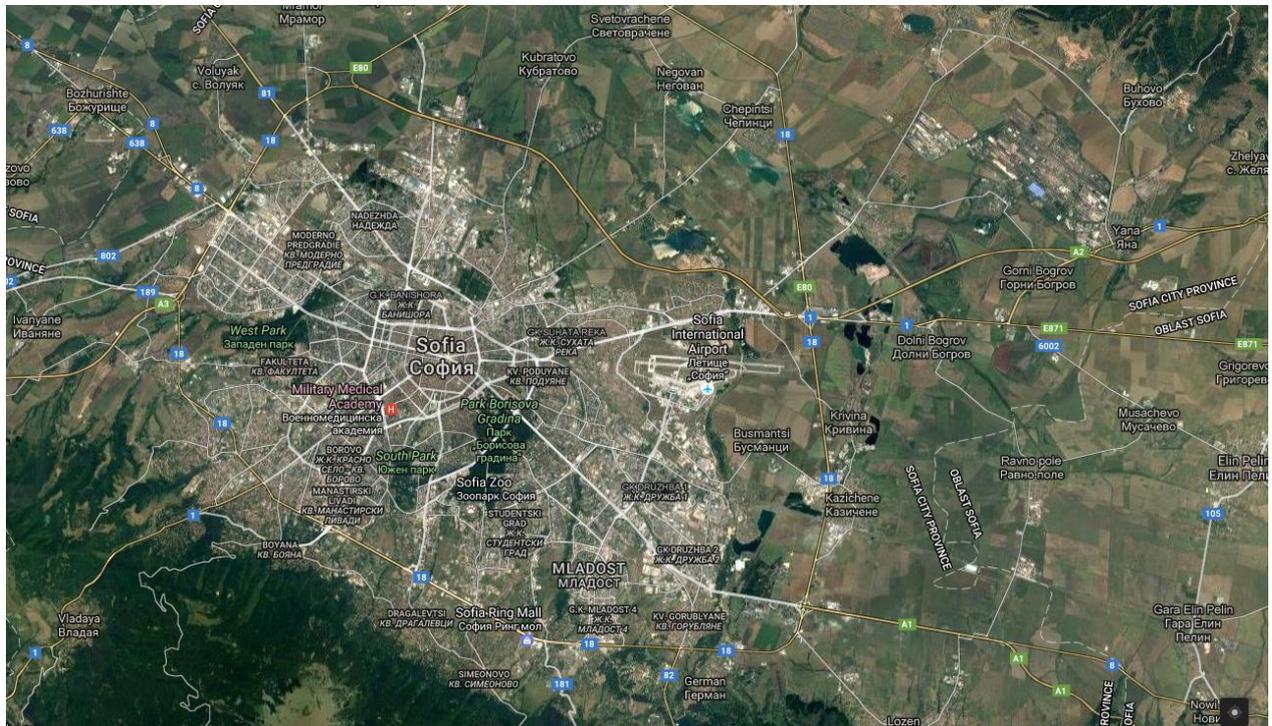


Figure: Aerophoto from Sofia, Capital of Bulgaria.

The City of Sofia is currently establishing components of a modern, compliant and integrated municipal waste management system that will meet the requirements of the EU waste legislation.

As part of the project a Mechanical Biological Treatment (MBT) plant was constructed at the Sadinata site with Refuse Derived Fuel (RDF) production capabilities. The RDF can be used as an alternative fuel in a co-generation facility at the Sofia District Heating Plant as well as in cement factories in Bulgaria. The public tender for the waste incineration plant feeding the district heating network is supposed to start in 2017. Once bio-waste and green waste have been sorted out (and processed in a separate plant nearby the Sadinata site [Han Bogrov]), the plant will treat all the household waste from Sofia. With a capacity of up to 410,000 tons per year, waste treatment operation is aimed to run 310 days a year, meaning that it will have an average daily treatment capacity of 1,320 tons and a production capacity for RDF of 180,000 tons per year.

In addition to the production of RDF, the MBT process comprises the mechanical/manual separation and sorting, plus the biological treatment of organic waste. Residual waste treated in the MBT plant is composed of two different streams: waste produced by households (household waste) and waste generated by shops, stores, offices and factories (commercial waste).

The plant for mechanical-biological treatment will be located on the site "Sadinata" (next to the newly built landfill for non-hazardous waste). The plant will process all the waste in Sofia excluding separately collected organic and green waste. The process of mechanical-biological treatment will include the following steps: mechanical/manual separation and sorting, biological treatment of organic waste and the production of RDF.

Processing tasks in the factory are:

- maximize the level of recycling of the separated materials;
- process the organic fraction in order to obtain a product compost like output (CLO) or stabilized compost, which could be used to recover the land or to improve the quality of the soil;
- produce RDF that could be used as an alternative fuel facility for co-generation of energy installations heating company and/or cement factories (only temporarily) in Bulgaria;
- sections and minimizes the amount of waste disposed to landfill and reduce the potential emissions of the landfill.

The biological waste treatment plant „Han Bogrov“ utilizes the organic fraction to obtain a compost like output (CLO), a stabilised compost which can then be applied in land remediation processes or as a soil improver. By segregating and finding alternative uses for waste the city aims at limiting and reducing the amount of waste that would potentially be deposited in a landfill, and will reduce potential emissions on the landfill.

The biological waste composting facility Han Bogrov is part of such a combined bio-and green waste management system. The section bio-waste includes a process of decomposition of water for producing biogas. The bio-waste facility was erected for processing food waste from commercial establishments and households. The facility is designed for a maximum capacity of 20,000 tons of food waste a year.

Waste, that will be collected, is specified as shown in the following table:

Waste	Input per Year [t]	Water content [%]	Amount of Disturbing Materials [t]	Amount of ferrous metals [t]
Industrial	9,800	70 – 90	400	100
Household	10,200	50 - 70		

According to the specifications of the waste, it will consist mainly of waste separated from kitchen, from the dining room and such that will be received by private households and grocery good industries.

The described biological waste facility consists of the following steps:

- Pre-treatment of organic waste from industry and households
- Anaerobic digestion (AP) with sanitation and drainage
- Biogas processing and utilization

- Composting fermentation residues (Source: <http://sofia-waste.bg>)

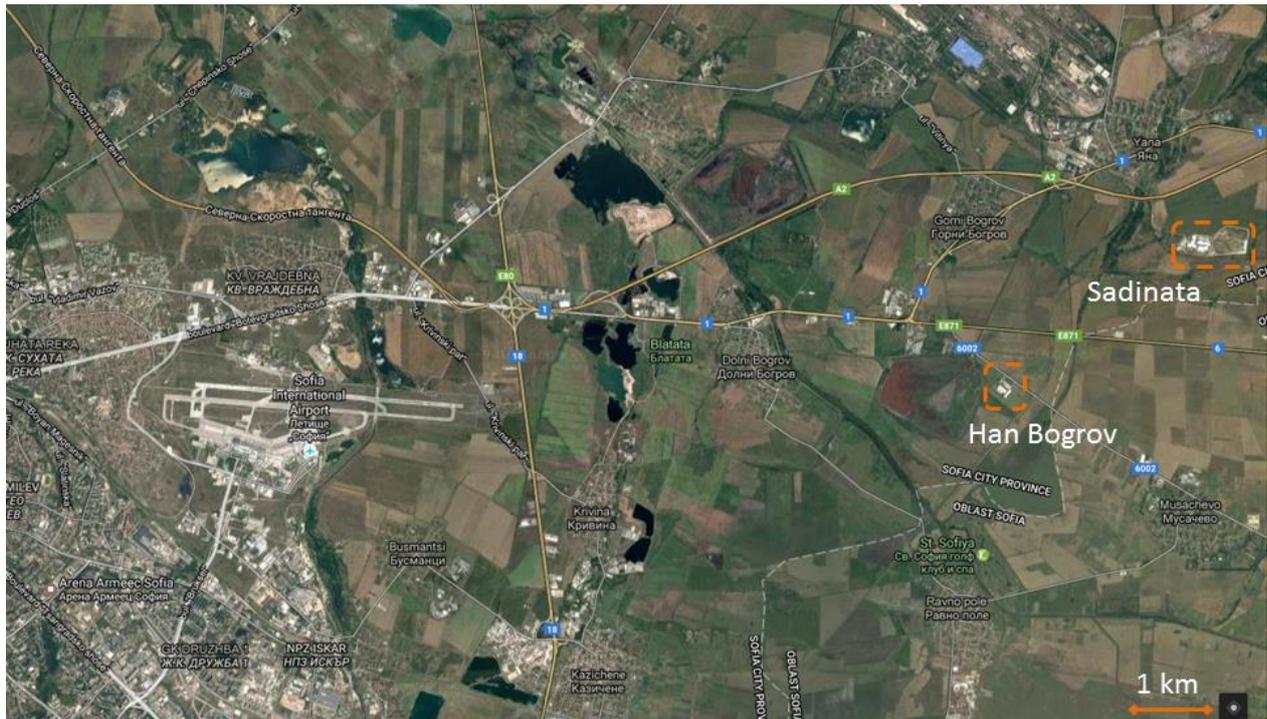


Figure: The locations of the MBT plant and the bio waste treatment plant.

For more information on the sites and plants, please consult annex 7.2.

### 3.2 Sofia district heating & the waste incineration plant with RDF utilization

Toplofikacia Sofia (Топлофикация София ЕАД) is the district heating company in Sofia. It operates one of the oldest and largest district heating networks in Bulgaria and on the Balkan Peninsula. Operation of the company started in 1949.

The company Toplofikacia holds a monopoly on heat distribution in the city and serves a heating network of 950 km for more than 430,000 client units (offices, flats etc.).

The company has four power stations – two cogeneration plants, and two heat-only boiler stations. All of these heating stations are operated by natural gas as source of energy. The company also has several temporary boiler stations throughout the city, which are normally in use during the winter months.

The construction of an energy utilization plant for municipal solid waste at Toplofikacia Sofia EAD will integrate a new component into the system of Toplofikacia operations. The RDF utilization plant will have an installed capacity of 58 MWt and 20 MWe.

From around 410,000 tons of mixed household and commercial waste, collected annually in Sofia, after recycling, composting and handling in a mechanical biological treatment (MBT) plant, 180,000 tons of RDF (refused derived fuel) will be generated annually with a caloric value of 12.0-15.0 MJ/kg.

After the utilization of the energy and processing in the RDF plant, inert materials and ash of the equivalence of around 50,000 tons annually will be separated for disposal. The environmental effect will be 150,000 tons CO<sub>2</sub> equivalent savings per annum.

The current status of this power plant is the preparation of the application form for financing and the check of the technical specifications for the public tender procedure for the construction of the plant.

Besides the waste incineration plant with RDF utilization several other activities are pursued for the upcoming year by Toplofikacia. Among these are:

1. The project "Increase of Heat Transfer Energy Efficiency" aims to annually replace about 21 km of old pipelines (about 63 km in total for 2016, 2017 and 2018) with pre-insulated district heating pipes.
2. Construction of cogeneration plant for Heat Only Boilers "Ovcha Kupel". The project includes installation of new co-generation modules with three gas engines with electric and thermal capacity of about 10 MW. The new co-generation facility will operate all year to cover the base heat load of HOB "Ovcha Kupel I" and HOB "Ovcha Kupel II".
3. Reconstruction and modernization of energy boiler units EK220 t/h No.7 and No.8 at the Thermal Power Plant (TPP) Sofia. The project comprises the reconstruction of boiler heating surfaces, replacement of old burners with new low emission burners, upgrade of boiler control systems and installation works of boiler flue gas utilization equipment.
4. Modernization of the turbine unit TG3 at TPP Sofia East. In order to meet the requirements of the Energy Efficiency Directive 2012/27/EC regarding high efficiency of cogeneration for district heating purposes, the existing condensing type turbine is intended to be replaced with a new backpressure steam turbine with a capacity of 30-35 MWel and 89 MWth.
5. Construction of a flue gas utilization facility for the boiler unit EK 220 t/h, No.9 at TPP Sofia. The project includes the installation of a new modern flue gas utilization system for boiler unit No.9 in order to collect and reclaim the heat energy contained in the outgoing flue gases.
6. Flue gas utilization at Heat Only Boilers. The project includes the installation of a new state of the art flue gas utilization system for some of the existing hot water boilers in order to reclaim the heat energy contained in the outgoing flue gases. (Source: <http://www.ebrd.com/work-with-us/procurement/p-pn-151204a.html>)



Figure: The location of the future waste incineration plant with RDF utilization.

### 3.3 The problem statement

For the workshop that took place from November 29<sup>th</sup> until November 30<sup>th</sup>, 2016 in Sofia, Bulgaria, no single problem statement has been formulated in order to work towards one objective during these two days. Instead the following meta-aim for both workshop days led through the program:

How to realize the agreement between the City of Vienna and the City of Sofia to work together in the fields of environment and energy on the operational level? How to set up bi-national and multinational projects of common interest? Which services are of particular interest for the City of Sofia, for the sake of which municipal departments of Vienna and City of Vienna companies can support?

Besides these leading objectives, the City of Sofia and the main stakeholders in realizing the workshop, the Waste Management Directorate, represented by its head Mr. Petyr Traykov and Mrs. Theodora Polimerova, and Toplofikacia formulated several questions which gave a hint which topics are of interest for know-how exchange and fields of cooperation. You can find all of these questions in annex 7.4.

## 4 The workshop program and workshop format

### 29.11.2016 Day 1

<b>Venue: Hotel "Arena di Serdica", ul. Budapeshta 2, Sofia</b>		
<b>Time</b>	<b>Topic</b>	<b>Person</b>
10.00	Welcome addresses: <ul style="list-style-type: none"> <li>• City of Sofia</li> <li>• Waste Management Directorate</li> <li>• City of Vienna (TINA Vienna)</li> </ul>	Yordanka Fandakova, Mayor of Sofia  Petyr Traykov, Waste Management Directorate  Vincent Neumayer
10.15	Introduction to the program <b>CapaCity – Urban Competences</b> and its ambitions  Presentation of the workshop program	Vincent Neumayer, TINA Vienna
10.30	Introduction to the city of Sofia from the point of view of energy planning: <ul style="list-style-type: none"> <li>• Supply situation in Sofia</li> <li>• Administrative situation in Sofia</li> <li>• Legal situation in Sofia</li> <li>• Strategic aims</li> <li>• Challenges and problems</li> </ul>	Toplofikacia Sofia EAD
11.00	<b>Coffee break</b>	
11.15	Activities by the Energy Center Vienna @ TINA Vienna	Vincent Neumayer, TINA Vienna

11.30	<p>Municipal energy supply and waste management in Vienna – operation of Waste Incineration Plant (WIP)</p> <ul style="list-style-type: none"> <li>• District Heating in Vienna</li> <li>• Renewable energies aka waste</li> <li>• Operational aspects of a waste incineration plant</li> <li>• Citizen participation in the construction and operation of a WIP</li> </ul>	Michael Kotschan. Wien Energie, (Vienna Public Utilities)
12.00	Questions and answers	
12.20	Introduction to the afternoon program	Vincent Neumayer, TINA Vienna
12.30	<b>(Light) lunch</b>	
13.30	Tour through the Sadinata plant	Waste Management Directorate
15.00	<b>Coffee break</b>	
15.30	<p>2 Workshop/Question sessions (if possible in two smaller rooms):</p> <ul style="list-style-type: none"> <li>- Brainstorming-Session: Next level transnational projects for the interconnection between waste management and energy management, How to institutionalize a cooperation between Sofia &amp; Vienna</li> <li>- Q &amp; A: Operational aspects of running a WIP – interconnections with municipal waste management; district heating &amp; waste incineration</li> </ul>	<p>City of Sofia, support by Rainer Müller, TINA Vienna</p> <p>Michael Kotschan, Wien Energie</p>
16.30	Concluding remarks (plenum)	<p>Petyr Traykov, Waste Management Directorate</p> <p>Vincent Neumayer, TINA Vienna</p>
16.45	<b>End of event</b>	

19.00	Dinner for international participants at <b>"L'instanT"</b> Sofia city, 24 Asen Zlatarov str.	Waste Management Directorate
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### 30.11.2016 Day 2

<b>Venue: Sofia Municipality, 33 Moskovska str.</b>		
<b>Time</b>	<b>Topic</b>	<b>Person</b>
09.00	Welcome addresses: <ul style="list-style-type: none"> <li>• Waste Management Directorate</li> <li>• City of Vienna (TINA Vienna)</li> </ul>	Petyr Traykov Waste Management Directorate  Vincent Neumayer, TINA Vienna
09.15	Introduction to the program <b>CapaCity – Urban Competences</b> and its ambitions  Presentation of the workshop program	Vincent Neumayer, TINA Vienna
09.30	Introduction to the waste management system in Sofia and the mechanical biological treatment (MBT) plant with RDF production – introduction to the new components of the city's waste management system	Municipal Enterprises for waste management
10.00	Waste management system in Vienna	Martina Ableidinger. MA 48, municipal department for waste management
10.30	<b>Coffee break</b>	
11.00	Planning and construction of waste treatment and waste incineration plants – presentation of the WKU – Wiener Kommunal-Umweltschutzprojektgesellschaft*  <small>*due to illness Mr. Anderle was forced to cancel his participation on short notice.</small>	Mr. Anderle. WKU
11.30	Vocational prerequisites for the operation of a waste incineration plant.	Michael Kotschan, Wien Energy

12.00	Q&A	
12.30	<b>(Light) lunch</b>	
13.30	<p>(in two small rooms) in depth workshop on:</p> <ul style="list-style-type: none"> <li>- Future qualifications and capacity building for operational personal in waste treatment plants</li> <li>- How to reshape the waste management system in Sofia. Lessons learned from Vienna.</li> </ul>	<p>Michael Kotschan, Wien Energie, (Mr. Anderle, WKU)</p> <p>Waste Management Directorate Sofia; Mrs. Ableidinger, MA 48</p>
15.00	<b>Coffee break</b>	
15.15	Presentation of results of the workshop sessions	Rainer Müller & Vincent Neumayer
15.30	Concluding remarks in plenum: Next steps, timetable, follow-up activities	Petyr Traykov & Vincent Neumayer
16.00	Tour through a district heating plant	Toplofikacia Sofia EAD
17.30	<b>End of event</b>	
18.40	<b>Departure to Vienna</b>	

## 5 Workshop findings

On the basis of the presence of key experts from Vienna, the workshop was organized by addressing mainly waste incineration and district heating by waste on day 1. On day 2, municipal waste management was in the focus. In small groups experts discussed concrete operational topics of both the operational side of waste incineration plants (WIP) and of waste management as municipal service face-to-face.

The City of Sofia and its administration is well aware of the models and technology used in Vienna. The cooperation on different levels lasts already for considerable time, taking into account that Bulgaria is one of the youngest members of the European Union.

Toplofikacia as district heating company of the city, as legal entity privatized but the shares are held by the City of Sofia, faces several challenges in the future. Current and short-term projects were presented and are part of the Annex (see Annex 7.2), but the biggest endeavour is met by reducing a considerable amount of financial debt (appr. 250,000,000 €) which is caused by wrong investments, deficient business models and defaulting customers which are unwilling (and unable) to pay their heat fees. Due to technical reasons, the only way to realize a penalty towards the defaulter is a legal process but no cut-off the heating supply.

Currently Sofia pursues a change of paradigm in order to achieve a shift in perception towards waste, which is a resource, but not mere rubbish. Several steps are conducted for this shift, as already described above.

### 5.1 New waste incineration plant with RDF use & district heating operations

Mr. Michael Kotschan, responsible operator for the WIP Spittelau in Vienna, Austria, gave an extensive insight into the renovation and re-equipment of the WIP Spittelau in 2012-2014. The investment for this overall renewal comprised in total 138 Mio. €. (see Annex 7.2). About 25 employees of the City of Sofia – Waste Management Directorate, Toplofikacia and other departments of the City participated in the workshop, asked relevant questions and commented on Wien Energie procedures. Particular interest was shown in regards to several technical aspects of a WIP design.

Advantages/disadvantages of carbon fibre filters versus electro dynamic filters were discussed. Additionally the quantity of personnel, organized in shifts in the WIP, the number of workers per line (four persons/line) and their overall education according to their rotation on the job, was discussed.

The grate for the WIP drew particular focus in the discussion: due to the high caloric value of the RDF (around 15 MJ/kg) conventional grates (uncooled and cooled), as suggested in the proposed design for the Sofia WIP with RDF utilization will show a very short life span. For such caloric value a fluidized bed furnace is recommended by the Viennese expert.

The planned WIP is currently designed with a grate for 60 bar and 430°C, as a water-cooled Martin grate system: The planned construction will be located in central Sofia. RDF from the new plant is going to serve as fuel. The RDF is going to be blended with other waste in order to decrease the calorific value to a level suitable for the grate. The concession for the construction has been obtained already. The call for bids is planned for spring 2017. Ramboll was responsible for the technical planning of the plant and have already completed this task. The WKU was assigned to review the technical planning/bidding documents.

The RDF plant (waste separation and RDF production), completed in 2015, was financed by the EU and costs were approx. 110 million € of which 85% were subsidies. The location is approx. 22 km from the city centre. According to Sofia it is the second largest plant of its kind in Europe with 440,000 t/y. The RDF is currently delivered to a Heidelberg cement plant (400 km from the RDF plant) for a surcharge of 0.2 €/t, transport expenses amount to approx. 25 €/t. For the future it is the aim to incinerate the RDF in the still-to-be-built grate incinerator in Sofia. The RDF contains about 0.69% of chlorine and shows a caloric value of 15.93 MJ/kg.

The biogas and composting plants are also newly constructed. Food waste is fermented, biogas is converted into electricity in block-type thermal power stations and the output is combined with soil/substrate and used to make compost.

The district heating grid is operated by Toplofikacia which struggles with approx. 250 million € of bank liabilities. The repayment of these liabilities was deferred until 2020 but there is no money available for investments into the district heating grid. Currently energy generation primarily originates from gas and the gas heating plants are going to be modernised throughout the next few years by small project improvements (see annex 7.2).

Relevant open questions during the discussion:

- With which fuels is the RDF blended in order to reach a calorific value suitable for the grate?
- Are these fuels available on the market in sufficient amounts at the planned price?
- Is it possible to create a profitable market with the RDF in the future?
- What is going to be done with remnants of the RDF production?
- Are all questions regarding the issues waste logistics/transport to a relatively distant RDF plant clarified?
- What is the business model for the RDF in combination with the RDF incinerating plant?

These questions haven't been clearly answered in order to assess the situation in Sofia as a whole within an integrative municipal waste management system. For the Viennese experts a thorough elaboration on these questions is essential in order to place recommendations for further systematic improvements.

Michael Kotschan suggests for the further course of action:

- Since the call for bids for the waste incineration plant was not yet published, there is currently no clear contact person for specific matters. In case in the future there will be the need for a further exchange of know-how, Wien Energie is available for that.
- In Vienna, WKU currently has the necessary know-how to plan and construct a waste incineration plant. Wien Energie also commissions WKU for such purposes and recommends an intensified cooperation.
- The business model of collecting and processing waste should be further analysed as these pre-settings are the basis for the plant system components to be built.

Thankfully Mr. Kotschan placed two offers towards the City of Sofia administration and Toplofikacia:

- On the website of Wien Energie detailed specifications and technical information on the waste incineration and upstream & downstream processes are available for semi-public download. A registration is necessary.
- For the preparation of staff for running the planned WIP with RDF utilization, Mr. Kotschan offers a twinning activity for a candidate from Sofia who would accompany workers from WIP Spittelau for three to six months. The only precondition for this offer is full professional proficiency in German by the coached worker from Sofia in order to train them on the job at a waste incineration plant first hand (operating know-how, organisation, maintenance, etc.). Those employees then have to spread the acquired know-how in Sofia.

## 5.2 Municipal Waste Management

The waste management topic, comprising several aspects of the integrative waste management system chain raised specific attention, mainly from the Waste Management Directorate of the City of Sofia. Mrs. Martina Ableidinger, responsible for international affairs at the Municipal Department 48 of the City of Vienna – Waste Management, presented in a comprehensive and interesting speech the pillars and specifications of the Vienna system.

Due to illness of Mr. Anderle, general manager of WKU – Wiener Kommunal- und Umweltprojektgesellschaft, Mrs. Ableidinger took over his part and introduced the know-how and potential services of this city-owned company, too. The WKU was founded on the basis of identified need for in-house know-how about the scope of services as presented today. The MA 48 as legal owner of WKU can show better flexibility and a closer cooperation with the help of this in-house company.

Presentations of both entities are available in the annex (7.2) of this report.

Although there has not been a presentation on the waste management in Sofia, the following facts are important to know in order to understand some of future challenges:

At the moment the waste management directorate in Sofia is divided in two departments: preparation and control of **procurement** for service providers for collection of waste (head: Mrs. Polimerova), and **planning and strategies** of future development of waste management in the municipal context (head: Mrs. Markova-Lukanova). Mr. Petyr Traykov is the head of the whole department. The waste management directorate coordinates waste management in the City of Sofia and deploys external companies in order to execute necessary services like collection of waste, transportation of waste, container provision etc., or city owned companies like Sofia Municipality Services Supervision unit (operation of the MBT and RDF production plants). Generally both systems in Vienna & Sofia are hardly comparable with each other. The City of Vienna bundles most waste management processes within one municipal department; the City of Sofia coordinates a more complex network of private/public entities.

In the Q&A session right after the presentations of Mrs. Ableidinger, as well as during the workshop-setting on late morning of day 2 of the CapaCity-Workshop (30.11.2016), several issues were highlighted and discussed as of particular interest for the City of Sofia.

- Design of and processes at recycling centres (waste dumps) as there are 17 of them in Vienna. Particular interest is paid by Sofia to:
  - How to choose the location of two potential sites for recycling centres in Sofia?
  - Which aspects does the city need to take into account concerning road and PT accessibility?
  - What types of buildings are necessary on site for the operation of recycling centres?
  - Is the proximity to the potential waste incineration plant of importance?
  - How to promote the use of such recycling centres among the population and the users?
  - How to fund such recycling centres? Do such centres generate return on investment?
  - What skills does staff need to bring in in order to work at recycling centres?
  - How to deal with hazardous waste at recycling centres? (in Sofia a call-system is in place)
- Lobbying at the European Commission with respect to European legislation. The role of municipal waste management departments when it comes to recycling quotas, etc. and the actual realization of waste management directives.

- How to manage the re-use of suitable goods at recycling centres? How to avoid corruption with such goods?
- How does a city provide recycling rate statistics for waste?
- Public procurement of contractors for performing municipal services.

As another topic in the discussion, the challenges of how to improve the awareness for separate disposal for household waste is underlined. MA 48 is aware that this is not easy to successfully achieve, but mainly people need to understand why they are supposed to separate. Secondly it needs to be convenient for people; otherwise only "hardcore-environmentalists" will effectively separate. Ultimately for stubborn naysayers penalties and financial sanctions are the way of creating consciousness.

## 6 Concluding Remarks

### 6.1 Tangible benefits for the city of Vienna

There is considerable potential future (economic) benefit and activities of work for City of Vienna companies, mainly WKU, but as well for Vienna based and Austria based companies, when it comes to cooperation work in the field of consultancy but as well in terms of actual implementation of Vienna/Austrian technical solutions for waste management and environmental technology.

The workshop intensified already existing relationships between the City of Vienna and the City of Sofia, especially when it comes to environmental topics. Several of the issues and challenges are on the table on which both cities could continue to cooperate, bilaterally or within transnational projects. But as well concrete process descriptions of the whole integrative waste management value chain would benefit from city twinning or continuous consultancy by accompanying the planning process in Sofia.

Regarding the specific scope of services by WKU the following fields seem to be most promising for future activities:

- Planning and Design of recycling centres (waste dumps).
- Technical supervision of the waste incineration plant with RDF utilization.
- Framework contract for continuous advisory works.

As a next step for the improvement of the district heating network, a project application, led by a City of Vienna stakeholder together with the cities Sofia, Belgrade and Sarajevo and potentially a city from Scandinavia, is planned to be drafted by TINA Vienna. The project application will enter the Horizon 2020 call „ Improving the performance of inefficient district heating networks“ EE-02-2017. The deadline for the call is June 7th, 2017. This activity gives the opportunity to every participant in the call to utilize European wide cooperation to analyse and tackle common problems of district heating networks from the technical as well as from a management point of view. However, prior any project development activity a definite commitment of the City of Sofia is requested as well as the provision of a waste management strategy of the city including the various built and planned facilities / technical elements. Based on that information the proper Viennese partner can be identified and the objectives of the envisaged project can be defined.

## 6.2 Next Steps & follow up activities

All participants at the workshop expressed their intention to continue cooperation through future activities. Nevertheless, the workshop showed a broad range of questions which have to be tackled during future collaboration and therefore more focus in upcoming formats of know-how exchange is needed.

Vienna Energy (Wien Energie) is a lean organization which hardly can cope with extensive know-how exchange processes between cities, due to capacity shortage in terms of human resources. Despite a deep willingness to give know-how and to show experiences, the structure of the company doesn't allow to commit many (human) resources to concrete project work and consultancy.

During the two-day visit in Sofia, experts from Vienna identified a few questions which seem to be of essential importance to be answered in order to follow a systematic path of integrative waste management in Sofia. For in-depth insight on these matters neither sufficient time was available, nor were suitable contact persons present at the workshop.

- Which are the business assumptions for the planning, construction and future operation of the waste incineration plant with RDF utilization?
  - How much RDF, household waste, additional "fuel" will be obtained from which sources? Which alternative markets for RDF are available in Bulgaria and beyond?
- To which extent will the waste incineration plant with RDF utilization improve the economic vitality of Toplofikacia as district heating provider?
- How will the integration of the waste incineration plant with RDF utilization and the MBT and RDF production plant be accompanied by strong and effective measures upstream the waste management process, particularly in the field of waste avoidance, waste re-use and extension of separate collection of waste?
- Currently several well elaborated planning steps and components in the waste management system are drafted or already implemented in the City of Sofia. Nevertheless, the angle on the value-chain on waste-management in Sofia seems to be underrated. Generally the workshop showed some disruptions in the process of the value-chain which most probably cause costs and a higher use of resources.

For the beginning of 2017 a follow-up workshop is envisaged which specifically should focus on one subdomain of all issues discussed from November 29<sup>th</sup> until November 30<sup>th</sup>, 2017. The workshop objective needs to be defined by the host city of Sofia. TINA Vienna again offers to organize the participants from Vienna for such a workshop. The current date for such a workshop is set for the beginning of February.

## 7 Annex

### 7.1 List of participants, contact details and participant's CVs

#### International Participants

<b>Surname</b>	<b>Name</b>	<b>Institute</b>	<b>e-mail</b>
<b>Ableidinger</b>	Martina	City of Vienna, MA 48	martina.ableidinger@wien.gv.at
<b>Anderle*</b> <small>*due to illness Mr. Anderle was forced to cancel his participation on short notice.</small>	Christian	WKU	c.anderle@wku.at
<b>Kotschan</b>	Michael	Wien Energie	michael.kotschan@wienenergie.at
<b>Müller</b>	Rainer	TINA Vienna GmbH	Rainer.mueller@tinavienna.at
<b>Neumayer</b>	Vincent	TINA Vienna GmbH	Vincent.neumayer@tinavienna.at
<b>Simova</b>	Irina	EuroComm PR GmbH	simova@eurocommpr.bg
<b>Straka</b>	Ulrike	Austrian Office for foreign trade	Sofia@advantageaustria.org

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## Martina Ableidinger

Born: 1973

Nationality: Austrian

Mrs. Martin Ableidinger has both a Master degree and a PhD in business administration with focus on environmental management and waste management. After her career as university assistant and the graduation as PhD, she became involved in MA 48, municipal waste management services of the city of Vienna in 2005. Among her activities she has been responsible for the operations of waste collection. Currently she works in international cooperation and as manager of the "Tandlermarkt" by MA 48.



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## Christian Anderle

Born: -

Nationality: Austrian

Christian Anderle is general manager of WKU – Wiener Kommunal- und Umweltschutzprojektgesellschaft mbH.



© WKU

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## Michael Kotschan

Born: -

Nationality: Austrian

Michael Kotschan graduated 1998 in process engineering at the University of Leoben, 2003 he finished a Master of Business Administration of generic management. Following he was university assistant at the Institute for sustainable waste management and disposal technology, 2004 he received his graduation as a doctor at the University of Leoben. From 2004 - 2007 founding and management of proionic production of ionic substances GmbH, since 2007 he is active for Fernwärme Wien GmbH - since 2007 management of the team optimization of operation; since 2008 head of department for management services, since 2011 general manager of the Geothermiezentrum Aspern GmbH, since 2015 CIO of waste incineration plant Spittelau.



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## **Rainer Müller**

Born: 1970

Nationality: Austrian

Rainer Mueller, M.Sc. Regional Planning, Technical University of Vienna, senior project manager at TINA Vienna, graduated in November 1995 in the field of spatial and regional planning. During his study he gained experience in the preparation and elaboration of environmental impact assessments for various railway projects in Austria. One major part of his work was the evaluation of relevant data and the creation of databases using GIS-techniques. Since September 1997 he works at TINA Vienna. His main tasks at TINA are the project management of various EU and IFI financed projects in the transport sector, the assessment and evaluation of transport infrastructure in the Balkan countries, CIS countries, CEEC and Turkey. In 1998/99 he spent six months as an expert at the European Commission, former DG XVI.E (Cohesion Funds) in Brussels. He was engaged in the preparation of the Instrument for Structural Policies for Pre-accession (ISPA) to support the responsible unit of the DG with the knowledge gained in the TINA process. Rainer Mueller is specialist in all matters related to TINA and ISPA Process, Transport Infrastructure within the TINA network, Pan-European Corridors and Areas, European transport policies and strategies as well as transport and mobility issues at an urban and regional level.



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## **Vincent Neumayer**

Born: 1987

Nationality: Austrian

Vincent Neumayer has degrees in both management of environmental and natural resources and regional and spatial planning. He gained professional experience in social infrastructure planning for the National Development Strategy of the Sultanate of Oman and in transport planning and development, as well as mobility and urban development planning as a consultant to the City of Vienna. His focus rests on project and implementation oriented planning for improved living conditions for citizens, including minimal environmental interference.

Besides the aforementioned, he is professionally interested in disaster risk management and natural disaster impact prevention through spatial planning.



## **Irina Simova**

Born: -

Nationality: Bulgarian

Irina Simova is head of the EuroComm PR Gmbh office in Sofia, Bulgaria. Since 2002 she is active in city cooperation matters with focus on exchange between the city of Vienna, Sofia and Bulgaria.



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## **Ulrike Straka**

Born: -

Nationality: Austrian

Mag. Ulrike Straka has been working at Advantage Austria since 1998. As a deputy economic delegate, she worked in New Delhi, Kiev and Sarajevo. From 2007 to 2012, she was the Austrian economic head delegate in the Algiers foreign trade center. From 2012 to 2014, Ulrike Straka headed the Africa / Middle East region at the Head Office of Advantage Austria in Vienna. Since August 2014, she has been head of the Austrian foreign trade center in Sofia as the Austrian economic delegate.



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infrastructure.bg



# CapaCity Workshop

Energy planning strategies & waste management

## List of participants

November 29<sup>th</sup>-30<sup>th</sup>, 2016, Sofia, Bulgaria

a format  
of



International

tinavienna

smart city agency  
energy center



SMART  
CITY  
WIEN

in cooperation  
with



	Surname	Name	Institute	e-mail	Signature
1	Ableidinger	Martina	City of Vienna, MA 48	martina.ableidinger@wien.gv.at	
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3	Kotschan	Michael	Wien Energie	michael.kotschan@wienenergie.at	
4	Müller	Rainer	TINA Vienna GmbH	Rainer.mueller@tinavienna.at	
5	Neumayer	Vincent	TINA Vienna GmbH	Vincent.neumayer@tinavienna.at	
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16	Minev	Milcho	Municipal Enterprises		
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	Surname	Name	Institute	e-mail	Signature
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24	Ivanova	Maria	Sofia Municipality	mg.ivanova@sofia.bg	
25	Mihailov	Nikolai	Sofia Municipality		
26	Atamian	Daniela	Sofia Toplofikacia		
27	Georgiev	Georgi	Toplofikacia Sofia		
28	Simova	Trimi	Дирекция-ТТ	simova@eurocommpr.bg	
29	Angelova	Youliana	КЕБП	yangelova@olker.bg	
30	Popova	Elxa	Municipalith	elipopo@olker.bg	
31	Alexandrov	Melena	subran office for foreign trade	sofia@advantageaustria.bg	
32	Nikolay	Nikolay	GEORGIEV	N.Nikolay@toplog.bg	



## 7.2 Presentations (ppts) of the workshop



CapaCity Workshop  
Sofia, Bulgaria

November 29th – 30th, 2016

A format  
of



**tinavienna**  
smart city agency  
energy center



In cooperation  
with



## CapaCity – Urban Competences The Ambition



- The program **CapaCity – Urban Competences** pursues a more deepened international cooperation between the City of Vienna, its organizations, partner organization from Vienna and other cities.
- Integrated urban development as holistic smart city approach is the main aspect of future activities within the program **CapaCity**.
- The programme is funded and supported by the **Municipal Department 27 - European Affairs** of the City of Vienna

20.12.2016

CapaCity - Urban Competences

2

## CapaCity – Urban Competences The Background



- Continuation of cooperation in the Danube region and beyond.
- Focus by the City of Vienna on the internationalization of organizations and companies.
- **CapaCity** as catalysator for grand international interest in Vienna solutions.

20.12.2016

CapaCity - Urban Competences

3

## CapaCity – Urban Competences The Activities



- Among others, the following activities are designed within the project **CapaCity**:
  - *Statistics about interest in Vienna urban solutions*
  - *Research on and collection of relevant challenges for future urban development*
  - *Organization of workshops in selected cities and towns with participation of Vienna stakeholders.*
  - *Project ideas and activities on the basis of organized workshops in **CapaCity** partner cities.*

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## CapaCity – Urban Competences The Topics



- Diverse sectors and topics are relevant for workshops within **CapaCity**. Among other these are:
  - integration and diversity policies
  - PPPs (private-public partnerships) for cities and municipalities
  - urban mobility and transport planning
  - strategies for tourism development
  - urban development visions
  - **district heating and –cooling**
  - new governance for cities
  - Infrastructure optimization
  - urban planning models land use planning
  - urban structural renewal and –development
  - **environmental technologies and waste management**
  - urban disaster management
  - Etc.

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## CapaCity – Urban Competences The Heritage I



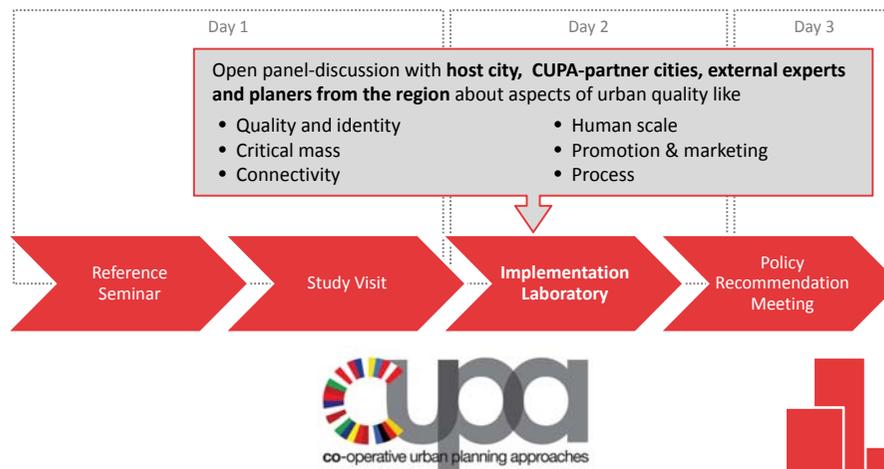
- The DonauHanse network as predecessor program of **CapaCity**
- The basis for **CapaCity** workshops:  
CUPA - Cooperative Urban Planning Approaches

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6

## CapaCity – Urban Competences The Heritage II

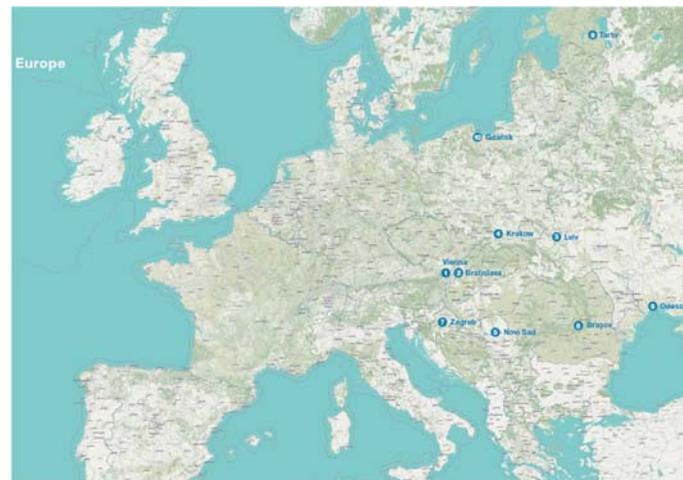


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## CUPA The Partner Cities 2010 - 2015



20.12.2016

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8

## CapaCity – Urban Competences The Partner Cities 2010 - 2016



20.12.2016

CapaCity - Urban Competences

9

## CapaCity – Urban Competences The Program Management



- TINA Vienna GmbH, the Smart City Vienna Agency, is responsible for the overall management of the **CapaCity** program.
- TINA Vienna provides expertise, analyzes and coordinates, TINA Vienna collects and informs, plans and implements, TINA Vienna supports the City of Vienna in terms of Smart City and Energy planning topics and it is a company of Wien Holding.

tina vienna  
■ smart city agency  
■ energy center

20.12.2016

CapaCity - Urban Competences

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## CapaCity – Urban Competences The Aim of Workshops



General aim of an **CapaCity** Workshop is to investigate as a group both new and persistent urban problems as they relate to sustainable city development.

Workshops develop measures and potential future activities in order to work together as City of Vienna and host city for a workshop.

20.12.2016

CapaCity - Urban Competences

11

## Toplofikacia SOFIA EAD

### Sofia District Heating Company

## COMPANY INFORMATION

- **The biggest municipal enterprise** in the city of Sofia
- Established in **1949**
- Generating **heat and power** and **transmission of heat energy**
- **One of the three largest energy complexes** in Bulgaria, a key factor for the energy balance in the country
- **The largest District Heating Company** in the country and on the Balkan Peninsula
- Provides service for **63 % of all heat users in Bulgaria**
- The company provides thermal comfort for nearly **1.5 million residents**
- Covers more than **430 000 offices, flats, public and private buildings, etc.**

## COMPANY INFORMATION

- Installed capacity of **310 MW electricity** and about **5 000 MW heat generating capacity**.
- Average annual production of more than **7,000,000 MWh heat power** and over **1 million MWh of electricity**.
- **11 heat sources (district heating plants)** operate on the territory of the capital
  - CHP „Sofia“ and CHP „Sofia East“, with combined cycle heat and power
  - Heating plants „Zemlyane“ and „Lyulin“ - only heat power
  - 7 water heating plants (WHP)
- **Annual turnover - 305 000 000 EUR (330 000 000 USD)**
- **Capital - 161 000 000 EUR (175 000 000 USD)**
- **Employees - 2 550**

## ENVIRONMENT PROJECT

### “Development of an Integrated System of Municipal Waste Treatment Facilities for Sofia Municipality“

Main purposes of the project:

- Implementation the directives of the EU and the Bulgarian legislation regarding **waste management and preservation of environment;**
- Treatment of municipal waste aiming for further **utilization of its energy**, protection from waste **accumulation** and its **recycling;**
- **Safe storage** of municipal waste in accordance with Directive EU 1999/31/EC

## IMPLEMENTATION of household waste management programme

The programme is at different stages of implementation:

- **Stage I, Khan Bogrov Village** - constructed composting plant and a plant on energy production from biowaste. The facility operated since January 2014;
- **Stage II, Yana Village** - constructed waste depot and construction of Factory for mechanical and biological treatment (MBT) of waste with production of RDF fuel. The factory operated since September 2015;
- **Stage III, “Design and Construction of Energy Utilization Plant for Municipal Solid Waste at Toplofikacia Sofia EAD”**- preparation of tender documents through consultancy assistance and engineering construction after ensuring of financing.

## Project: “Design and Construction of Energy Utilization Plant for Municipal Solid Waste at Toplofikacia Sofia EAD”



Architecture daytime view

## ESSENCE OF PROJECT

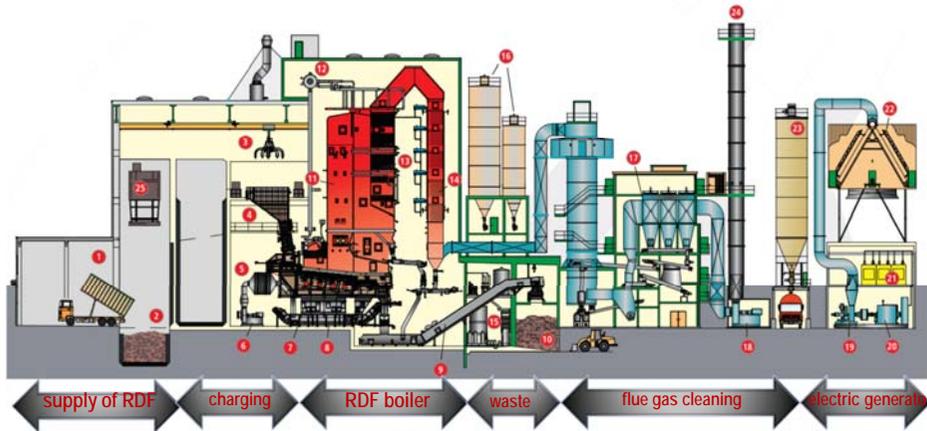
- From around **410,000 tonnes** of mixed household and commercial waste, **collected annually in Sofia**, after recycling, composting and handling in a mechanical biological treatment (MBT) plant, **180,000 tonnes of RDF** (refused derived fuel) will be generated annually with **caloric value of 12.0-14.0 MJ/kg**.
- After utilization of the energy and processing in the RDF plant, inert materials and ash of the equivalence of around **50 thousands tonnes annually will be separated for disposal**
- RDF utilization plant will have an installed capacity of **58 MWt and 20 MWe**
- The environmental effect will be **150 000 tonnes CO2 equivalent savings per annum**
- Project duration: **40 months**
- Total cost: **158 000 000 EUR (171 000 000 USD)**
- Status: Preparation of Application form for financing

## RDF PROJECT IMPLEMENTATION PLAN

- **EIA procedure** – positive decision was issued which is appealed in the Court. Expected finalization through the Court decision – **December 2016**;
- **Starting** procurement procedures for: **Selection of Contractor** for Design and Construction – **First quarter 2017**.
- Submission and **approval of Application Form** and supporting documents to EC – **December 2016**;
- **Commissioning of the CHP-RDF Plant** – **end of 2020**.

## SCHEME OF ACTIVITIES

RDF combustion plant meeting modern requirements for efficient and safe operation.



## PROJECT IMPLEMENTATION BENEFITS

- **Maximum utilization of the energy from RDF waste**, modified fuel, produced from the household waste of Sofia;
- **Diversification of the fuel base** for the production of energy in the heating utility company, substitution of natural gas with RDF waste;
- **Enhancing the energy efficiency** in the production through the application of highly-efficient technical solutions;
- **Reduction of greenhouse gas emissions** at regional and national level;
- **Reduction in production expenditures** and relative independence from seasonal and current changes natural gas prices;

## ENVIRONMENTAL EFFECTS

### Underground waters

- During normal operation **no impact is expected on the quantity and chemical condition** of underground water
- The project **will not use underground waters** for household, industrial and other needs.
- The project **will not generate or discharge industrial waste waters**



## ENVIRONMENTAL EFFECTS

### Landscape & Pollution

Site of	Area [decare]	Pollutant	Limit value [mg/Nm <sup>3</sup> ]
TPP SOFIA	377.310	NO <sub>x</sub>	200
		SO <sub>2</sub>	35
The project area	15.200	CO	100
		dust	5



The analysis of the landscape components, its nature, structure, sensitivity and importance shows that the investment proposal is **without drastic changes in the adjacent territory.**

## ENVIRONMENTAL EFFECTS

### Health and hygiene aspects

- The operation of the cogeneration plant utilizing RDF in Sofia is not expected to have an adverse impact on the environment and will not pose a health risk for the staff and the population in the region.
- No major adverse cumulative impact is expected, as a result of the activities in the area of impact of the project and the interaction of the different components and factors of the environment.
- There are no trans-border impacts.

## WASTE MANAGEMENT

- Strict compliance with the requirements for transportation and disposal of technological (slag) and hazardous waste (boiler and fly ash).
- Divided collection of waste on the production site, temporary storage and transfer to authorized companies.
- Involves direct minimization of the waste of the city of Sofia by around 75% and its use for the production of energy.
- Reducing the harmful impact of waste on the natural and social environment will reduce the negative effect to a minimum

## TOPLOFIKACIA SOFIA PROJECTS

### Financing

- **Financed by:** Kozloduy International Decommissioning Support Fund (KIDSF), managed by EBRD
- **Grant funds:** Euro 21,5 Millions (approx. USD 23,4 Millions)
- **Goal:** financing the implementation of 6 projects related to the *Upgrade and Modernization of Sofia District Heating Production and Distribution System*

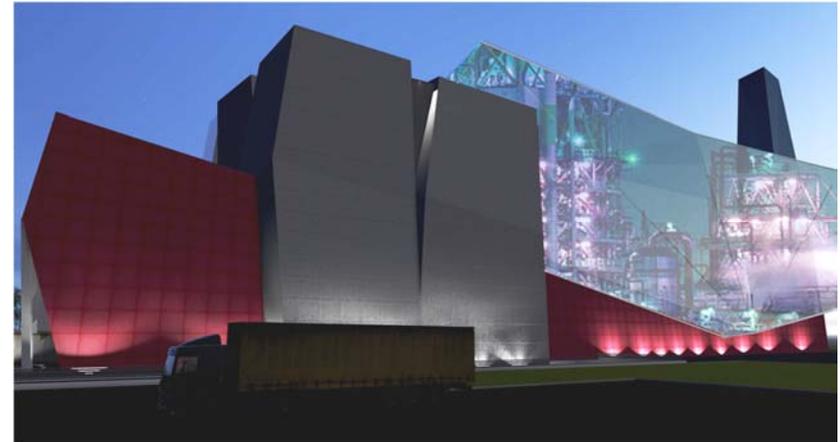
## TOPLOFIKACIA SOFIA PROJECTS

- **Improve energy efficiency in heat transmission by replacement of 100 km of the heat transmission network**
  - Increase in efficiency of heat transmission: 5%
  - Reduction of heat losses: 45 000 MWh
  - Decline of CO<sub>2</sub>: 10 000 tonnes CO<sub>2</sub> equivalent annually
  - Preserved primary energy amount: 49 966 000 kWh annuallyStatus: Pipes for 36 km DHN supplied and 30 km of them installed in 2015. Pipes for 21 km DHN will be supplied and installed **annually for 2016, 2017 & 2018**
- **Construct a co-generation plant in water heating plants (WHP) ‘Ovcha Kupel’**
  - Decline of CO<sub>2</sub>: 4 300 tonnes CO<sub>2</sub> equivalent annually
  - Installed capacity: 10 MWe and 10 MWtStatus: Launching of the tender – **Dec. 2016**
- **Reconstruct and upgrade of two boiler units in TPP ‘Sofia’**
  - Decline of CO<sub>2</sub>: 30 886 tonnes CO<sub>2</sub> equivalent annually
  - Preserving primary energy amount: 153 488 000 kWh annuallyStatus: Expected Contract signing – **Dec. 2016**

## TOPLOFIKACIA SOFIA PROJECTS

- **Upgrade turbine generator TG 3 in TPP ‘Sofia Iztok’ with a new counter-pressure turbine**
  - Expected gross hourly utilization: **6 500 hours**
  - Decrease in CO<sub>2</sub>: **7 500 tonnes of CO<sub>2</sub>** equivalent annually
  - Preserved primary energy: **37 209 300 kWh** annually
  - Installed capacity: **30 MWe** and **75 MWt**Status: Launching of the tender – **Second quarter 2017**
- **Building a utilization installation to boiler unit EK 220 t/h No 9 at TPP Sofia**
  - Expected result: **reach defined limit of NO<sub>x</sub>** in flue gases
  - Additional heat utilization without additional fuel: **10 MWt**Status: Launching of the tender – **January 2019**
- **Utilize flue gases in WHP**
  - Efficiency of the boilers increase: **12%**
  - Natural gas savings: **2 150 000 cubic meters** annually
  - Decrease in CO<sub>2</sub>: **4 025 tonnes of CO<sub>2</sub>** annually
  - Preserved primary energy: **20 000 000 kWh** annuallyStatus: Launching of the tender – **May 2018**

## THANK YOU FOR YOUR ATTENTION!



# Energy! ahead

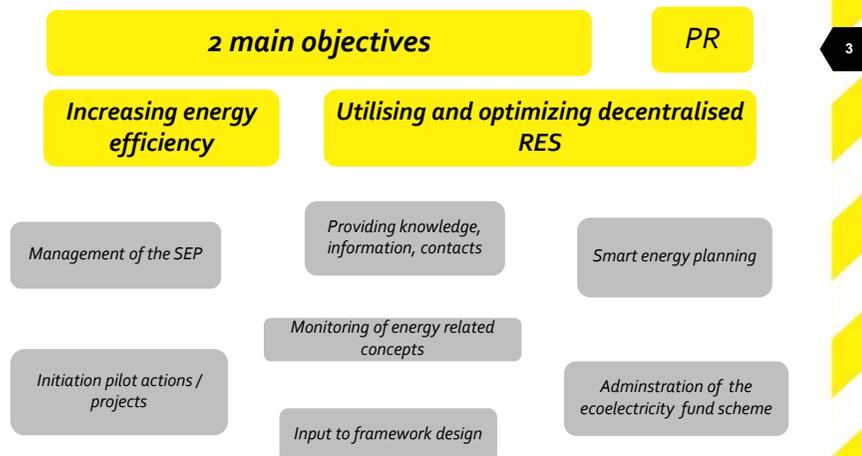
Energy Report of the City of Vienna

## MA 20 – Energy planning

- Since 1.1.2011
- Within the city council for Urban Planning, Traffic & Transport, Climate Protection, Energy and Public Participation
- ~15 employees
- Head of the department: Bernd Vogl (since 1.9.2011)
- Contact: +43 1-4000-88301



## MA 20 AS SERVICE PROVIDER



## Challenges

- Rethink energy behavior – enormous increase in energy efficiency necessary
- A wide variety of potential renewable energy sources has to be used
- Energy storage is a top issue
- Strengthen new “hip” energy-extensive life patterns (virtual travelling)





## MA 20 – energy ahead!

### fundings

- Fundings for renewable energy plants, energy efficiency programs and energy storages
- Funding-services for renewables and energy efficiency
- Direct communication for solar energy fundings:  
Beate Ebersdorfer: +43 01-4000-88323
- Direct communication for efficiency fundings :  
Ursula Heumesser: +43 01-4000-88324



## Energy Center Wien

- Established in 2013
- 5 employees
- Performance mandate
- Interface between
  - politics & administration and
  - science & business
- to be able to
  - transfer know-how
  - build up further capacities and
  - initiate and support activities
- to reach the cities energy and climate goals



## Energy Center Wien

- Governance
  - Urban learning
- Business models
  - Smart Service
  - Infinite
- Process support (development concepts)
  - klimaaktiv
  - Smarter together
- Technology
  - EcoRegeneration
  - Energy Lab East
- Networking



## Energy Center Wien

Ziel ist es, an der Schnittstelle zwischen Politik, Verwaltung auf der einen und Forschung und Wirtschaft auf der anderen Seite gezielt Know-how und Kapazität zu stärken. Diese Informations- und „Übersetzungsarbeit“ in beide Richtungen soll Mehrwert schaffen und Aktivitäten anstoßen bzw. unterstützen.  
Mittel- bis langfristiges Ziel ist es, durch diese Schnittstellenarbeit ein starkes Netzwerk von kompetenten PartnerInnen für die Umsetzung der städtischen Energie- und Klimaschutzziele aufzubauen und dabei das Energy Center als Anlaufstelle und Brückenkopf für externe Stakeholder im Energiebereich in Wien zu etablieren.

Die Tätigkeiten und Aufgaben des Energy Center Wien setzen den Beschluss des Gemeinderates vom 20. Februar 2015, Pr. Z. 00129-2015/0001-GSK um. Der Tätigkeitsumfang wird darin folgendermaßen festgelegt:

- Aufbereitung von Datengrundlagen zur Weiterentwicklung energiepolitischer Rahmenbedingungen in Wien;
- Operative Umsetzung von Maßnahmen im Rahmen des Städtischen Energieeffizienzprogramms und des Aktionsplans für erneuerbare Energien für die Stadt Wien;
- Begleitung und Betreuung von Pilotprojekten in Wien;
- Bereitstellung einer Kooperations- und Kommunikationsplattform zur Vernetzung von Stakeholdern;
- Sammlung von Best-Practice-Modellen im Energiebereich;
- Erstellung energiewirtschaftlicher Studien und Beratung der Stadt in speziellen Energiefragen;
- Inhaltliche Begleitung der energierelevanten Smart City Aktivitäten Wiens;
- Beteiligung, Koordination und Teilnahme an nationalen und internationalen Projekten;
- Umsetzung von energiebezogenen bewussteinbildenden Maßnahmen;
- Unterstützung beim Monitoring des Städtischen Energieeffizienzprogramms und des Aktionsplans für erneuerbare Energien;
- Beobachtung europäischer und internationaler Entwicklungen im Energiebereich;
- Beteiligung an und Mitwirkung bei energierelevanten Arbeitskreisen.

Das im Energy Center Wien gebündelte Know-how und die vorhandene Kapazität steht prinzipiell allen energierelevanten Magistrat und in Unternehmen der Stadt Wien zur Verfügung, um die Bemühungen im Energie- und Klimaschutzbereich Ebenen zu unterstützen und voranzutreiben. Direkter Ansprechpartner für die Stadt Wien ist die Magistratsabteilung für Energieplanung (MA 20).

Die jährlichen Schwerpunkte werden in Abstimmung mit der MA 20 festgelegt und orientieren sich an den Schwerpunkten der Stadt Wien. Dies gilt ebenso für die Teilnahme an extern finanzierten Projekten („Drittprojekte“), insbesondere an jenen, (Ko-)finanzierungsbedarf besteht.





## MA 20 – Planungen für die Energiezukunft

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- **Energieeffizienz:**

SEP -



- **Erneuerbare Energie:**

**R**AP Vie – **R**enewable **A**ction **P**lan Vienna

- **Monitoring/Berichte/Controlling**



## MA 20 – Energiezukunft jetzt!

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### FÖRDERUNGEN

- Förderung von Ökostromanlagen und Energieeffizienzprogrammen
- Förderservice Erneuerbare und Energieeffizienz
- Direkter „Solardraht“ Förderungen:  
Beate Ebersdorfer - 01/4000-88323
- Direkter „Effizienzdraht“ Förderungen:  
Ursula Heumesser – 01/4000-88324



## MA 20 – Energiezukunft jetzt!

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- Leuchtturmprojekte entwickeln/unterstützen
- BürgerInnensolarkraftwerk
- Solarpotenzialkataster
- Informations- und Öffentlichkeitsarbeit
- lokale Konzepte
- Service für städtische Stellen
- Gutachten
- etc.



## MA 20 – Energieplanung

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- seit 1.1.2011 eingerichtet
- gehört zur Geschäftsgruppe Stadtentwicklung, Verkehr, Klimaschutz, Energieplanung und BürgerInnenbeteiligung
- Personal: derzeit 15 Personen
- Leitung seit 1.9.2011: Bernd Vogl
- Kontakt: Tel. 01-4000-88301





## SPITTELAU WTE- HISTORY

- 1969 – 1971: construction of MSWI Spittelau district heat plant to ensure heat supply of Vienna General Hospital
- 1987: major fire destroyed the plant almost completely
- 1989 – 1992: rebuilt and facade redesigned by the artist Friedensreich Hundertwasser



## SIGNIFICANCE OF SPITTELAU

- Thermal recovery of approx. one third of municipal waste in Vienna
- Central location:
  - Short transport routes for garbage truck
  - Optimum integration into district heating network and district cooling network
- World-famous facade design by Friedensreich Hundertwasser



## OBJECTIVES OF ENERGY OPTIMISATION

- Refurbishing required after 40 years of operation
- Tripling electrical power output to ca. 14 MW
- Emission level and waste capacity remain unchanged
- Savings of 5 million m<sup>3</sup> natural gas per year
- Expansion of famous Hundertwasser design to the new constructed parts of plant



## TECHNICAL DATA – PRE REFURBISHMENT

### Capacity

- Design capacity: 2 x 15t/h with heat value of 7,5 MJ/kg
- Actual capacity: 250.000 t/a residual waste at 9 MJ/kg

### Equipment

- 2 waste incinerators (1969)
- Martin reverse-acting grate (1992)
- Flue gas cleaning by electrostatic filters, 2-stage flue gas scrubbing, electrodynamic venturi system, catalytic DeNOx facility (1989)

### Energy generation

- Saturated-steam back-pressure turbine: power output ca. 5 MW (1989)
- All-year feed-in into the district heating network ca. 400 GWh/a



## REFURBISHING MEASURES

### Grate/boiler

- Installation of wider grates
- Unchanged capacity of ca. 250,000 t/a; design heating value 10 MJ/kg
- Installation of modern vertical-tubed boilers (40bar, 400°C)
- Renewal of slag conveyor system

### Energy generation

- Extraction back-pressure turbine to replace saturated-steam turbine
- 2-stage district-heating converter

### Flue gas cleaning

- Existing electrostatic filter replaced by fabric filter, optional addition of activated carbon
- Dismantling of electrodynamic venturi system
- Existing SCR unit (op. temp. 280°C) replaced by a low-temperature catalytic DeNOx unit (op. temp. 190°C)
- Heat shifting system (flue gas scrubbing, SCR unit) instead of gas burners to heat the flue gas

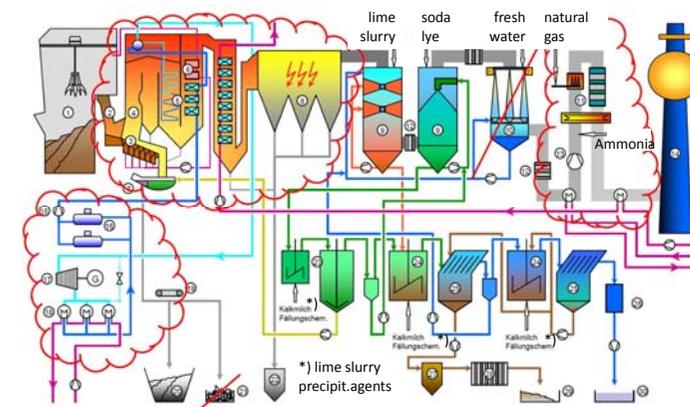


## INCREASE OF ENERGY EFFICIENCY

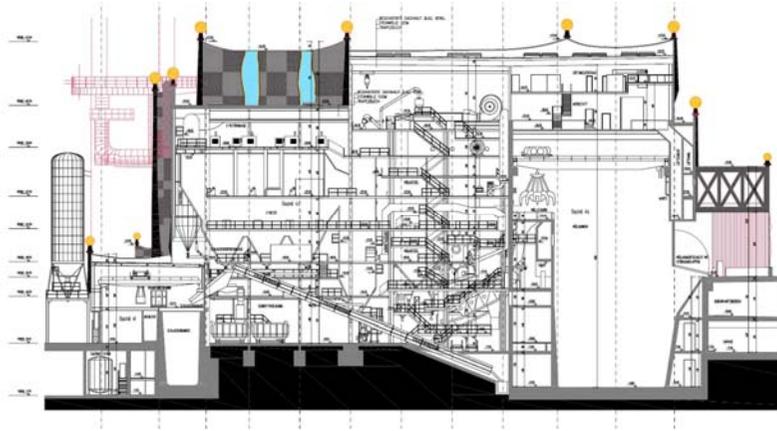
Energy generation		Pre-refurbishing (operating data)	Post-refurbishing (design data)
Thermal Input of fuel	MW	2 x 42,6	2 x 44,4
Steam generation	t/h	2 x 45	2 x 54,5
Steam parameters	bar <sub>a</sub> / °C	33 / 240	40 / 400
O <sub>2</sub> -content of flue gas	Vol. % tr.	9,2	8,0
Natural gas consumption	Nm <sup>3</sup> /h / MW	650 / 6,5	-
Electricity generation	MW	5,0	13,86
thereof power grid feed-in	MW	1,0	9,5
District heat generation	MW	60,0	58,0
Efficiency rate	%	66,5	76,0



## REFURBISHING MEASURES



## PLAN OF EXISTING PLANT



## PLAN OF NEW PLANT



## PARTICULAR CHALLENGES

- Refurbishment during ongoing operation
- Site constraints because of central urban location
- Close to underground line
- Preservation of artistic design by Friedensreich Hundertwasser



## MAIN CONTRACTORS

- Furnace  
Mitsubishi Hitachi Power Systems Europe Service GmbH
- Water-steam-system  
Integral Engineering GmbH, Integral Montage GmbH
- Turbine  
Integral Montage GmbH, Sub-contractor: MAN Turbo AG
- SCR  
Strabag AG



## BUDGET

↻ Furnace	65,3
↻ Water-steam-system	10,5
↻ Turbine	7,0
↻ SCR	12,3
↻ Electrical measurement and control technology	15,5
↻ Control system and software	3,0
↻ Construction engineering	7,9
↻ Dismantling	2,7
↻ Building construction	10,7
↻ Supervision	2,2
Total	138 Mio €



## REFURBISHING TIMETABLE

↻ April 2012:	Start dismantling & construction boiler 2
↻ July 2013:	Start construction turbine & generator
↻ Sept. 2013:	Start dismantling & construction boiler 1
↻ Sept. 2013 – Feb. 2014:	Downtime for entire plant
↻ March 2014:	Start test run boiler 2
↻ May 2014:	Start electricity generation
↻ May 2015:	Start test run boiler 1
↻ Nov. 2015:	Formal taking over



## INITIAL STATE 2011



## REFURBISHED SPITTELAU 2015





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A-1090 Wien

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**THANK YOU FOR YOUR ATTENTION!**

VON WIENERGIEBÜNDELN  
FÜR WIENERGIEBÜNDEL.



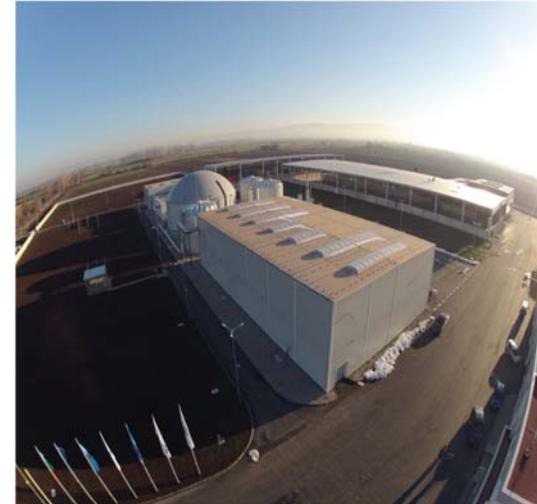
## Municipal Enterprise for Waste Treatment in Sofia Municipality



### INSTALLATION FOR BIO-WASTE TREATMENT "HAN BOGROV"

"Integrated system of municipal waste treatment facilities for Sofia Municipality"  
Operational programme "Environment 2007-2013" Grant Agreement No. DIR-592113-C001/27.07.201

## INSTALLATION FOR BIO-WASTE TREATMENT "HAN BOGROV"



The installation for bio-waste treatment (IBT) "Han Bogrov" is part of Phase I of project No. DIR 592113-1-9 "Development of an Integrated System of Municipal Waste Treatment Facilities for Sofia Municipality". The project was implemented with the financial support of Operational Programme "Environment 2007-2013" and a loan provided by the European Investment Bank.

IBT Han Bogrov's capacity amounts to 44,000 t/year and includes:

- Composting installation for biodegradable waste;
- Composting installation for green waste;

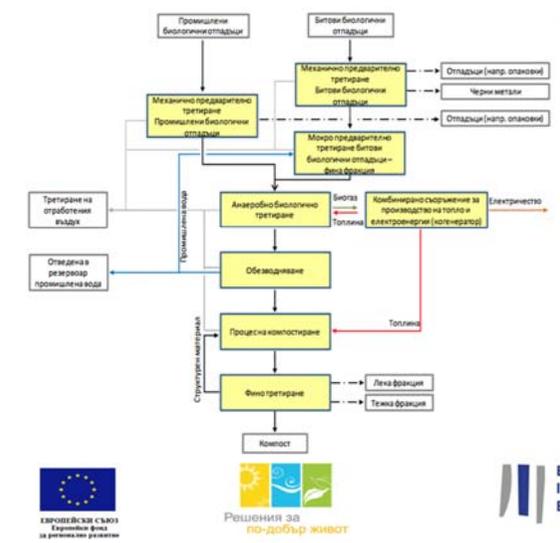
IBT "Han Bogrov" owns a permission No. CT-05-2337/20.12.2013

## INSTALLATION FOR BIO-WASTE TREATMENT "HAN BOGROV"

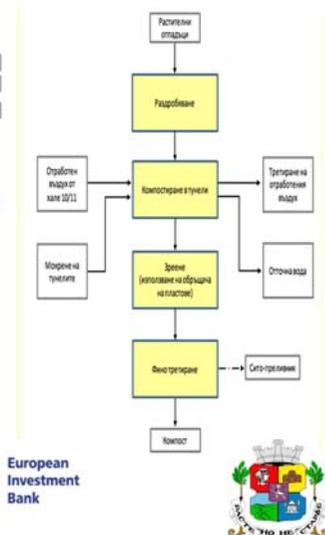
- Currently, bio-waste management in Sofia Municipality covers separate collection of food waste from **schools, kindergartens, marketplaces, shops, hotels, hospitals and other sites on the territory of Sofia Municipality** and green waste of **public areas, parks, gardens, green areas between apartment buildings**
- The system coverage may be expanded to also **include households** on the territory of Sofia Municipality
- Following a Sofia Municipality's Mayor Order, the Municipal Enterprise for Waste Treatment in Sofia Municipality **collects and transports** food waste and currently it services over **650 sites**

## INSTALLATION FOR BIO-WASTE TREATMENT "HAN BOGROV"

Technology line for food waste treatment



Technology line for green waste treatment



## INSTALLATION FOR BIO-WASTE TREATMENT "HAN BOGROV" COMPOST – "THE BLACK GOLD"

- Composting – part of the **natural cycle**
- It has **the unique ability** to enhance soil's physical, chemical and biological properties
- **Restores** soils of poor quality
- **Increases** yields
- **Stops and prevents** soil erosion
- It can **link heavy metals** and prevent them from entering water and/or plants
- **Improves** soil's ability to preserve moisture
- This is a way we can get **natural, nutritional and healthy food**



## INSTALLATION FOR BIO-WASTE TREATMENT "HAN BOGROV"

### PARAMETERS OF INPUT RAW MATERIALS FOR COMPOSTING

- **Humidity**
- **Particle size**
- **Organic matter**
- **C/N ratio**

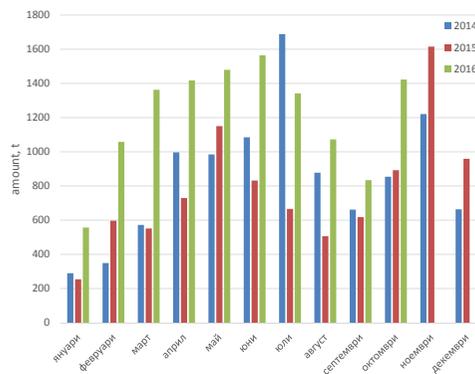
### MAIN PROCESS PARAMETERS

- **Input raw materials' homogenization**
- **Temperature mode**
- **Humidity**
- Compost rows' **volume/cross-section**
- **Turning and aeration rate/intensity**



## INSTALLATION FOR BIO-WASTE TREATMENT "HAN BOGROV"

### Delivered Amount of Green Waste



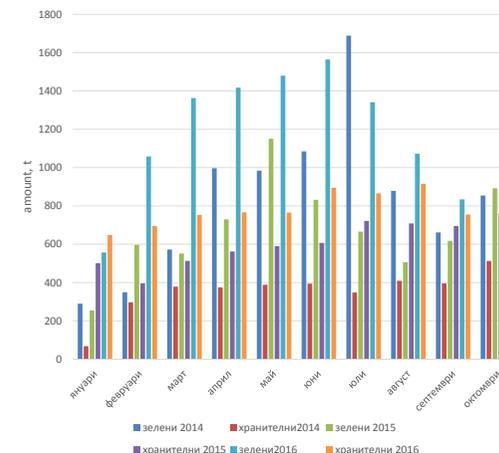
Delivered by the separate collection system at Sofia Municipality

- Green waste deliveries are irregular and no steady increase or decrease is observed
- Deliveries are seasonal and influenced by atmospheric conditions during the respective month



## INSTALLATION FOR BIO-WASTE TREATMENT "HAN BOGROV"

### DELIVERED AMOUNT OF GREEN WASTE BY YEAR



At the installation, a steady trend to increasing delivered amounts of bio-waste is observed

- In 2014, 22% of food and 43% of green waste capacity are filled
- In 2015, respectively 36% of food and 39% of green waste capacity are filled
- In January – October 2016, 38% of food and 50% of green waste capacity of the installation are filled



## INSTALLATION FOR BIO-WASTE TREATMENT "HAN BOGROV"

### Generating Electricity from Food Waste

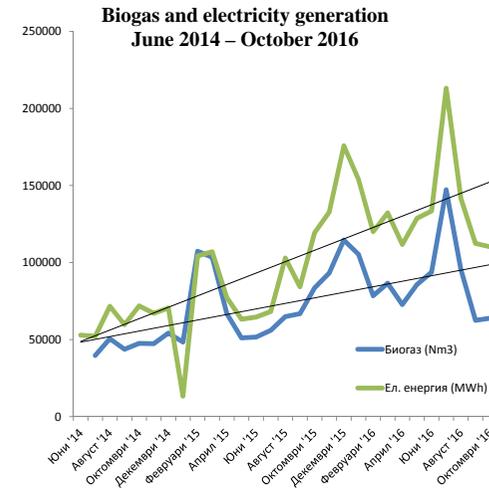


- Anaerobic digestion – a **controlled anaerobic process**, during which bio-waste is digested under the effect of specific microorganisms
- The process has **4 phases** – hydrolysis, acidogenesis, acetogenesis and methanogenesis
- **2 main products** are obtained – biogas and fermentation products
- Biogas is utilised into 2 **KTEA** for electricity and heat generation
- **Electricity** is directly supplied into the power grid, and **heat** is mainly used for technological needs



## INSTALLATION FOR BIO-WASTE TREATMENT "HAN BOGROV"

### Achieved Results

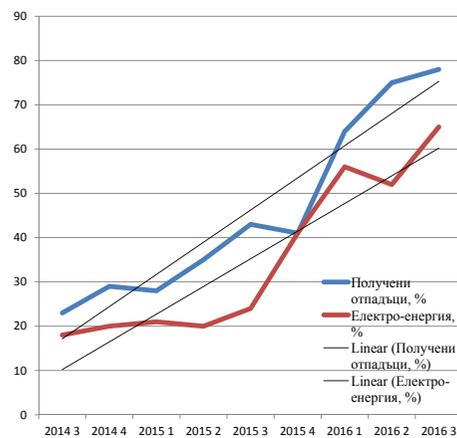


- A clear trend towards electricity generation **increase** is observed
- **The amount** of produced biogas is increasing smoothly
- The biogas **quality** is significantly higher
- The amount of generated electricity is **increasing** significantly compared to starting values



## INSTALLATION FOR BIO-WASTE TREATMENT "HAN BOGROV"

### Achieved Results



- There is a correlation between per cent load by waste and electricity generated
- A process reaction offset by time is observed regarding the delivered waste



## INSTALLATION FOR BIO-WASTE TREATMENT "HAN BOGROV"

### Products of Installation Activity

	Received bio-waste, t	Produced compost, t	Generated electricity, MW/h
2014	14,721	3,000	625
2015	16,722	5,529	1,557
2016	19,772	4,650	1,900



## INSTALLATION FOR BIO-WASTE TREATMENT "HAN BOGROV"

### Earnings from Products and Services Provided

	Food waste treatment, BGN	Green waste treatment, BGN	Generated electricity, BGN	Compost sold, BGN
2015	31,805	4,654	385,682	34,534
2016	38,827	4,336	474,297	33,536



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Европейски фонд  
за регионално развитие



Решения за  
по-добър живот



European  
Investment  
Bank



## INSTALLATION FOR BIO-WASTE TREATMENT "HAN BOGROV"

### FREE COMPOST

- Following a Sofia Municipality's Mayor Order, citizens who have paid a municipal waste tax for 2014/2015 and for 2015/2016 **may get up to 10 kg free compost**
- Compost given to Sofia Municipality citizens for 2015 - **632** citizens – **6.32** tonnes in total for 2016 - **1332** citizens – **13.32** tonnes in total



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Investment  
Bank



## INSTALLATION FOR BIO-WASTE TREATMENT "HAN BOGROV"

- All products of IBT activity are qualified by the Austrian Compost and Biogas Association as per the requirements of Bio-waste Ordinance;
- Since early 2015, the enterprise has been a member of the Austrian Compost and Biogas Association and since November 2015 has owned a quality certificate;
- Currently, the installations is undergoing a procedure to become a member of European Biogas Association;
- The installation is registered by the Bulgarian Food Safety Agency as an enterprise for conversion of Category 3 animal by-products (ABPs), and derived products into biogas and compost



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## INSTALLATION FOR BIO-WASTE TREATMENT "HAN BOGROV"

### Planned Activities to Increase Efficiency of Provided Services

1. Additional sites **inclusion** and filling up existing routes
2. **Development** of a route with sites, which would be serviced during a different time range in order to include sites with different working hours
3. **Buying** more specialized vehicles to transport bio-waste, etc.
4. **Servicing** sites which generate Category 3 ABPs
5. **Promoting** offered products and services



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THANK YOU FOR YOUR  
ATTENTION



# Municipal Enterprise for Waste Treatment in Sofia Municipality



## MECHANICAL BIOLOGICAL TREATMENT (MBT) PLANT WITH RDF PRODUCTION

"Integrated system of municipal waste treatment facilities for Sofia Municipality"  
Operational programme "Environment 2007-2013" Grant Agreement No. DIR-592113-C001/27.07.201



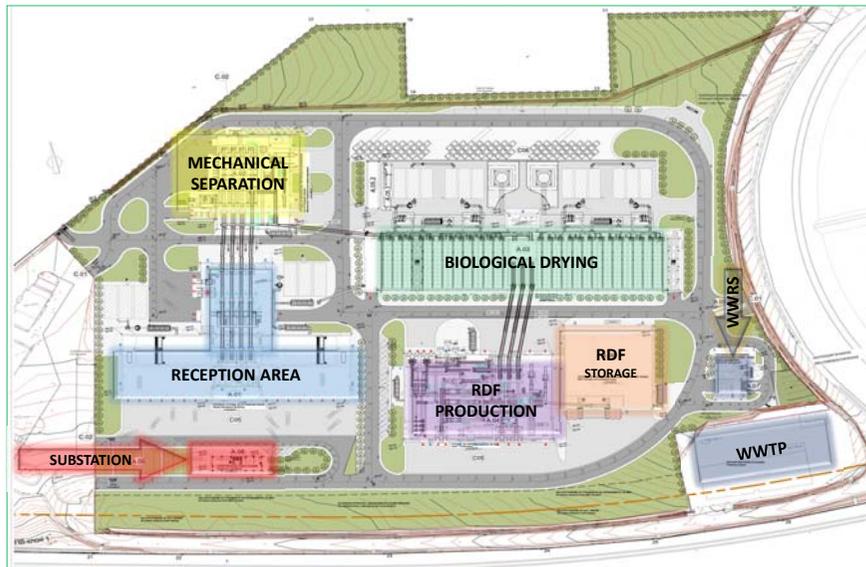
## MECHANICAL BIOLOGICAL TREATMENT (MBT) PLANT WITH RDF PRODUCTION



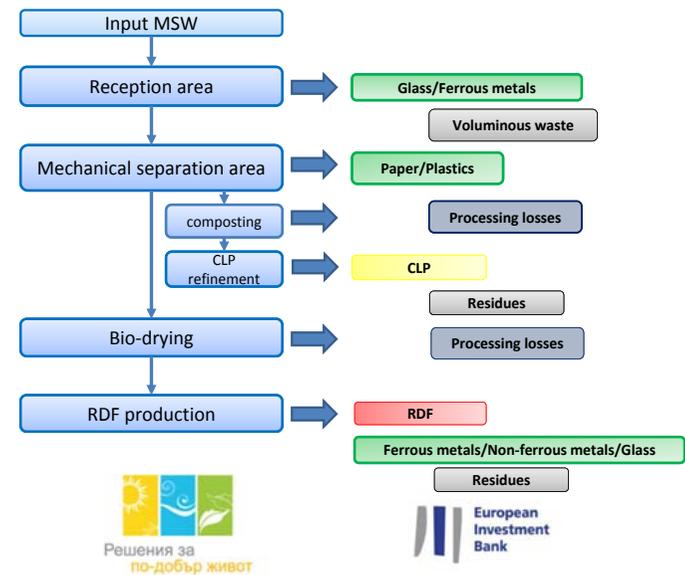
The MBT plant is Phase 2 of project No. DIR 592113-1-9 "Development of an Integrated System of Municipal Waste Treatment Facilities for Sofia Municipality". The project was implemented with the financial support of Operational Programme "Environment 2007-2013" and a loan provided by the European Investment Bank.

The MBT plant has a usage permission No. CT-05-1517, dated 12 September 2015

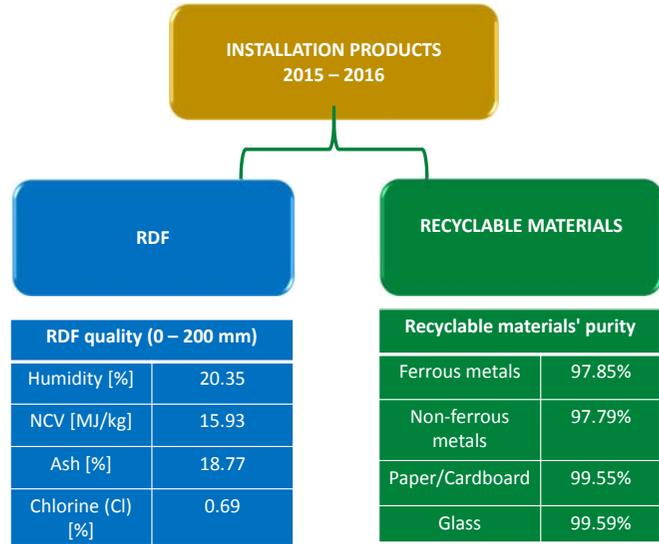
## MECHANICAL BIOLOGICAL TREATMENT (MBT) PLANT WITH RDF PRODUCTION



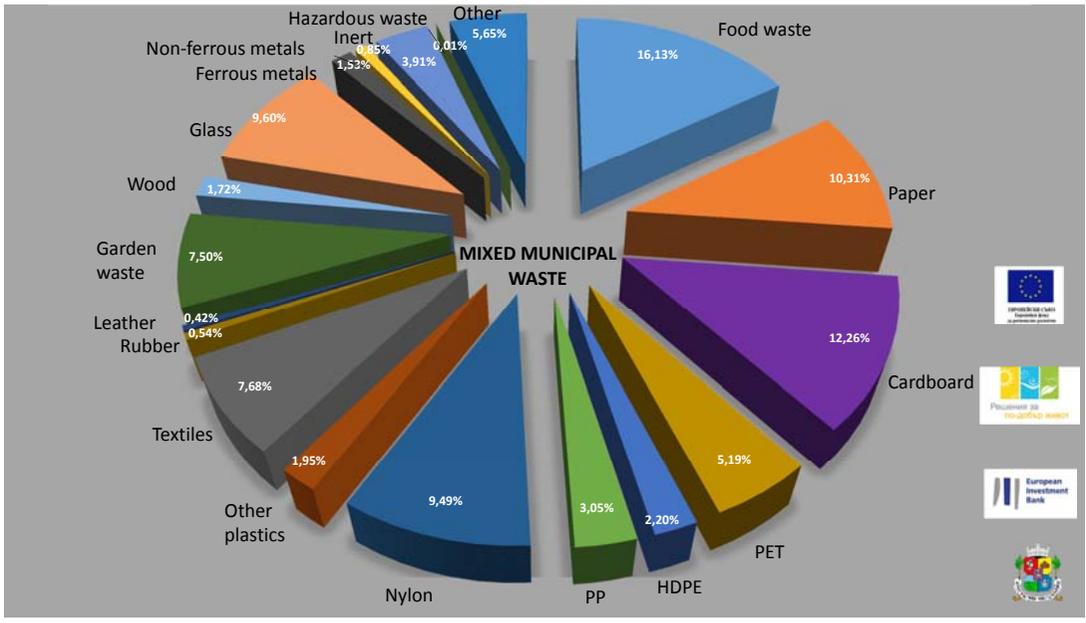
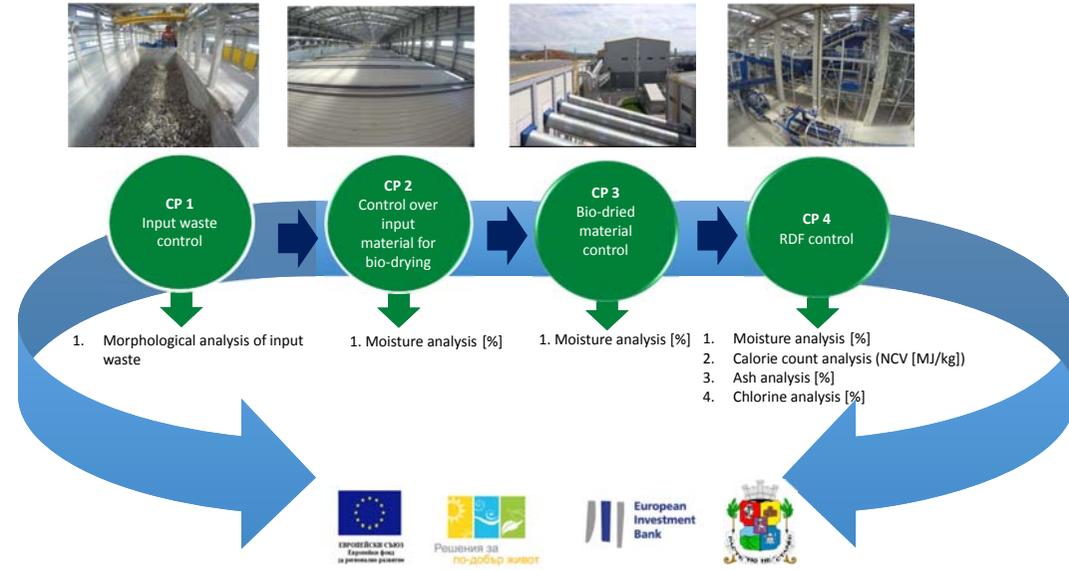
## MECHANICAL BIOLOGICAL TREATMENT PLANT PROCESS DIAGRAM



### MECHANICAL BIOLOGICAL TREATMENT (MBT) PLANT WITH RDF PRODUCTION



### QUALITY CONTROL DURING RDF PRODUCTION



MONTHLY AVERAGES OF INDICATORS ANALYSED IN THE PRODUCED RDF (0 – 200 mm)

Показатели	Референтни стойности	Октомври 2015 г.	Ноември 2015 г.	Декември 2015 г.	Януари 2016 г.	Февруари 2016 г.	Март 2016 г.	Април 2016 г.	Май 2016 г.	Юни 2016 г.	Юли 2016 г.	Август 2016 г.	Септември 2016 г.	Октомври 2016 г.	Тренд
Влага [%]	<20	11,79%	14,20%	26,78%	25,16%	20,80%	19,85%	18,75%	19,53%	17,90%	22,83%	27,05%	21,31%	18,56%	
NCV [MJ/kg]	<20	20,56	22,89	21,91	21,38	20,51	22,64	22,44	21,57	21,19	21,17	21,47	22,17	22,54	
NCV [MJ/kg]	14-17	16,87	18,34	14,59	14,57	14,87	16,62	16,92	15,99	16,05	14,92	14,23	16,11	17,01	
Пепел [%]	< 20		14,03%	20,56%	20,14%	19,72%	18,54%	16,83%	17,10%	19,90%	19,87%	19,57%	19,84%	19,12%	
Cl [%]	< 0,75		0,65%	0,78%	1,01%	0,64%	0,68%	0,61%	0,65%	0,49%	0,57%	0,63%	0,92%	0,68%	



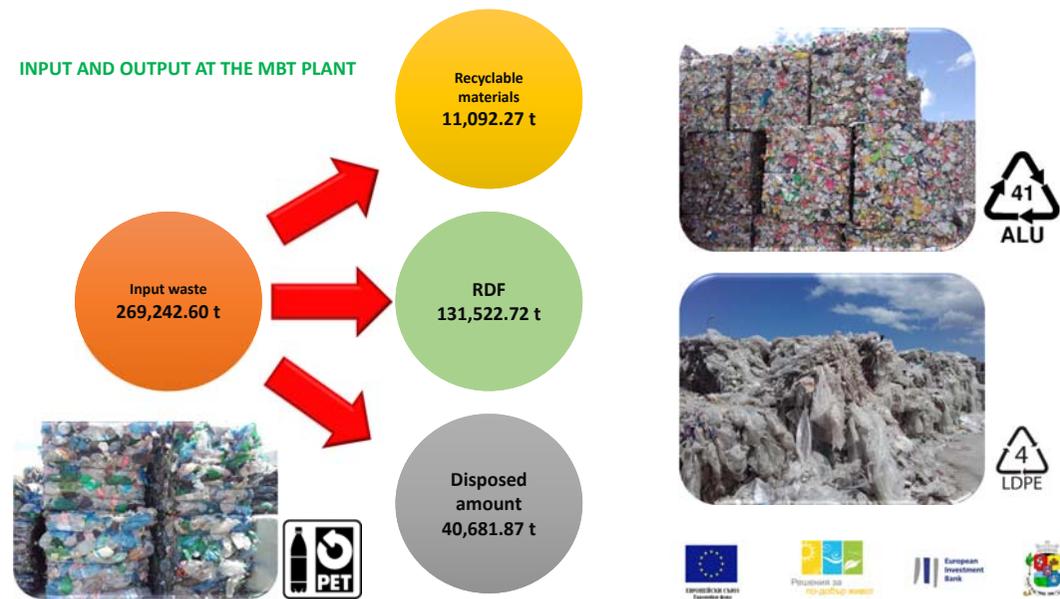
### AVERAGES OF INDICATORS ANALYSED IN THE PRODUCED RDF



Pelleted RDF	0 – 200 mm	30 – 200 mm	0 – 30 mm
Moisture [%]	24.87	18.08	24.40
HCV [MJ/kg]	11.32	22.19	11.45
NCV [MJ/kg]	7.02	17.67	9.30
Ash [%]	45.09	18.77	39.76
Chlorine [%]	0.62	0.78	0.59



### INPUT AND OUTPUT AT THE MBT PLANT



### MUNICIPAL ENTERPRISE FOR WASTE TREATMENT IN SOFIA MUNICIPALITY – Cost per tonne of treated waste at the MBT plant

Month	Cost [BGN]	tonne/waste [t]	BGN/tonne [BGN]
September 2015	113,799.33	438.00	259.82
October 2015	182,727.00	3,289.00	55.56
November 2015	258,281.33	6,189.30	41.73
December 2015	356,070.00	8,451.26	42.13
January 2016	350,537.50	13,273.92	26.41
February 2016	477,268.00	12,429.55	38.40
March 2016	557,299.00	21,330.94	26.13
April 2016	719,970.00	24,419.07	29.48
May 2016	867,121.00	29,352.84	29.54
June 2016	825,509.34	28,357.68	29.11
July 2016	882,039.00	31,655.40	27.86
August 2016	885,717.00	30,432.00	29.10
September 2016	901,323.00	31,018.880	29.06
October 2016	887,117.00	31,827.240	27.87

Reception and treatment of 100% of MSW, generated on the territory of Sofia Municipality



### COST PER TONNE OF MBT WASTE AT 100% LOAD

Period: April 2016 – October 2016

Total cost	Tonne/waste	Price/tonne
BGN 5,816,587.00	201,299.74 t	BGN 28.90



**ANNUAL QUANTITIES OF RECEIVED FOOD AND GREEN WASTE, PRODUCED ELECTRICITY AND COMPOST AT IBT "HAN BOGROV"**

ANNUAL QUANTITIES OF COLLECTED FOOD WASTE AT IBT "HAN BOGROV"	SEPARATELY RECEIVED AT IBT	ANNUAL ELECTRICITY GENERATED AT IBT "HAN BOGROV"	GENERATED AT IBT
Food waste for 2014	4,478.36 t	2014	623,000 kW/h
Food waste for 2015	7,353.35 t	2015	1,522,000 kW/h
Food waste (January – October)	7,661.94 t	2016 (January – October)	1,900,579 kW/h



ANNUAL QUANTITIES OF COLLECTED GREEN WASTE AT IBT "HAN BOGROV"	SEPARATELY RECEIVED AT IBT	ANNUAL COMPOST PRODUCED AT IBT "HAN BOGROV"	PRODUCED AT IBT
Green waste for 2014	10,242.99 t	2014	3,000 t
Green waste for 2015	9,369.24 t	2015	5,529 t
Green waste (January – October)	12,110.29 t	2016 (January – October)	4,650 t



THANK YOU FOR YOUR ATTENTION!



ЕВРОПЕЙСКИ СЪЮЗ  
Европейски фонд  
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# Municipal Waste Management in Vienna



Dr. Martina Ableidinger

City of Vienna – MA 48  
Waste Management, Street Cleaning and Vehicle Fleet



StoDt+Wien  
Wien ist anders.

# MA 48: Municipal Department of the City of Vienna

## Waste Management

- Waste material collection
- Waste treatment



## Street Cleaning

- Winter road clearance
- Recycling Centers (Waste dumps)



## Further Services

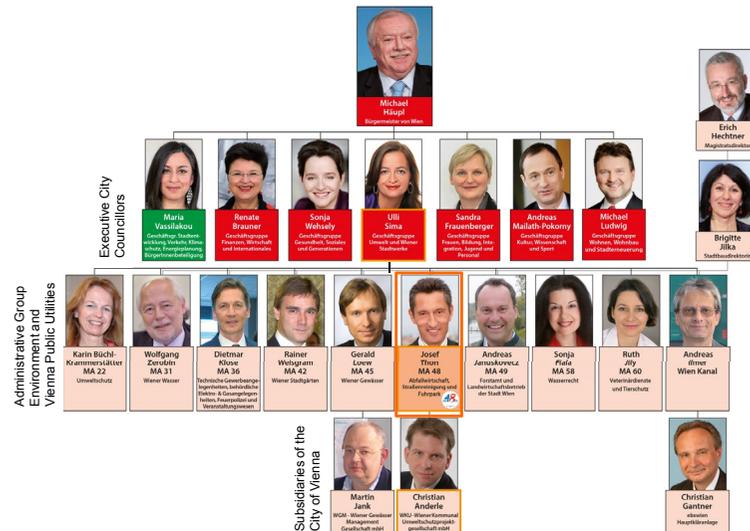
- Vehicle fleet
- Towing service
- Central lost & found office
- Public toilets

ca. 3.200 employees



StoDt+Wien  
Wien ist anders.

# MA 48 in the context of the City of Vienna



StoDt+Wien  
Wien ist anders.

# Vienna: basic facts

Population: 1.840.573  
Households: 872 000  
Area: 415 km<sup>2</sup>



StoDt+Wien  
Wien ist anders.

## Waste Management in Vienna

The City of Vienna is responsible for household waste:  
Collection – Treatment / Recycling - Disposal

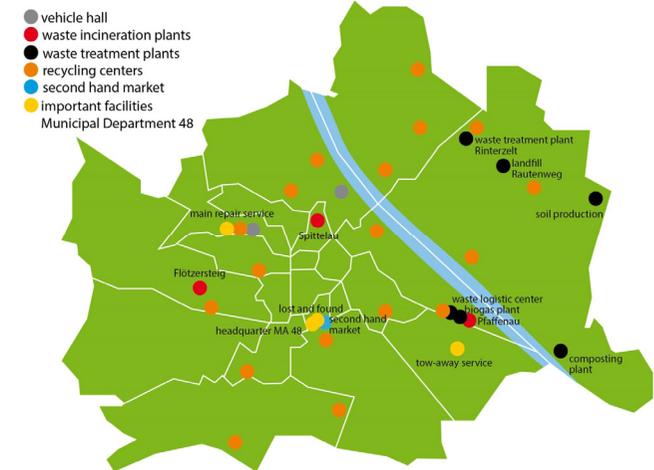
### Strategy:

- promoting **waste prevention**
- separate collection for **meaningful recycling**
- **thermal treatment** of residual waste & heat production for district heating



StadT+Wien  
Wien ist anders.

## Important Sites of Waste Management in Vienna



StadT+Wien  
Wien ist anders.

## Waste Material Collection

approx. 750.000 t / year (systematic collection)  
of which 520.000 t are residual waste

- 227.000 residual waste containers
- 211.000 waste material (Altstoff) containers
- 4.350 waste material collecting sites
- 18 waste dumps



256 collecting vehicles in daily use



845 bin men / garbage collectors



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Wien ist anders.

## Collection of Residual Waste

- containers: volume of 120 – 2.200 litres



- discharge *at least* once a week
- **curbside system:** container directly on the property (approved location in a waste room or on the property)
- **Charging** of waste fees through the tax notice to the building owner



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## 4.350 Waste Material Collecting Sites



Waste material collection for recycling

- Waste glass
- Scrap metal
- Biodegradable waste
- Plastic bottles
- (Waste paper)



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## 19 Recycling Centers („waste dumps“)

- waste material
- problematic material
- WEEE (E-Waste)
- bulky waste
- construction waste from households
- flea market goods



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## Systematic Collection – Summary

Systematic Collection	waste containers on site	waste material collecting sites	Recycling centers (waste dumps)	collecting sites for problematic material
	(curbside system)	(bring system)	(bring system)	(bring system)
residual waste	X			
biodegradable waste	X	X	X	
waste paper	X	X	X	
waste glass (white/colored)		X	X	
scrap metal		X	X	
plastic bottles		X	X	
other waste material			X	
waste electronic devices			X	
problematic material			X	X



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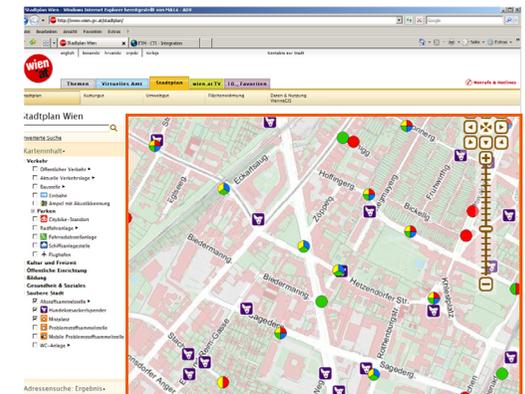
## Bring Systems – Information on the Internet

Information in the application or on the online city map

<http://www.wien.gv.at/stadtplan/>

**Öffentliche Einrichtung**  
**Bildung**  
**Gesundheit & Soziales**  
**Saubere Stadt**

- Altstoffsammelstelle ▶
- Hundekotsackerspender
- Mistplatz
- Problemstoffsammelstelle
- Mobile Problemstoffsammelstelle
- WC-Anlage ▶



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## Collecting Vehicles (for residual waste and waste material)



## Containers & Skips

- Roll-off containers and press skips:  
9, 12, 16, 18, 24 & 30 m<sup>3</sup>
- Application areas:  
waste dumps, markets, large facilities  
(hospitals, office buildings,...)



## Waste Glass Collection

- Lift container is equipped with 2 separate compartments
- Discharge with a crane vehicle  
special requirements for the sites:  
9 m clearance above; vehicle access
- Demand-based intervals (lift containers)



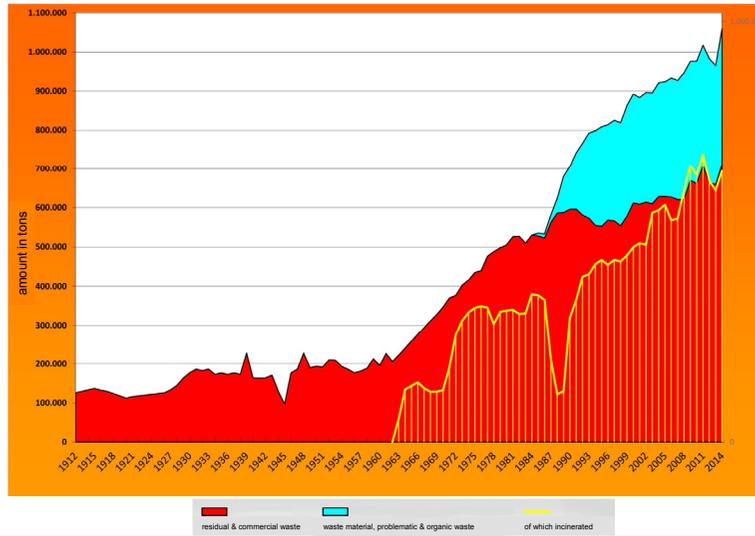
## Color Guide System & collection quantity of systematic collection

fraction	amount/inhabitant/year*	collecting since	amount in tons (year 2015)
residual waste	288 kg/inh./y	since 1839	518.512
noninfectious hospital waste	3 kg/inh./y	since 1977	5.547
waste paper	66 kg/inh./y	since the 70s	118.422
scrap metal	2 kg/inh./y	since 1985	3.024
mixed plastic packaging	4 kg/inh./y	since the 80s	6.322
plastic bottles		since 2005	
Glasverpackungen	16 kg/inh./y	since 1977	28.443
biodegradable waste (incl. food waste)	40 kg/inh./y	since 1991	72.610

\* approx. 1.800.000 inhabitants



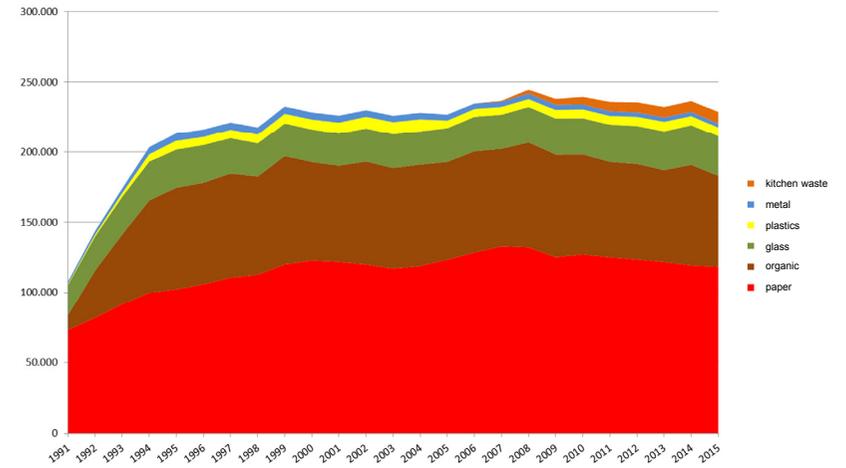
## Development of collection amounts in Vienna



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## Collection quantity waste material

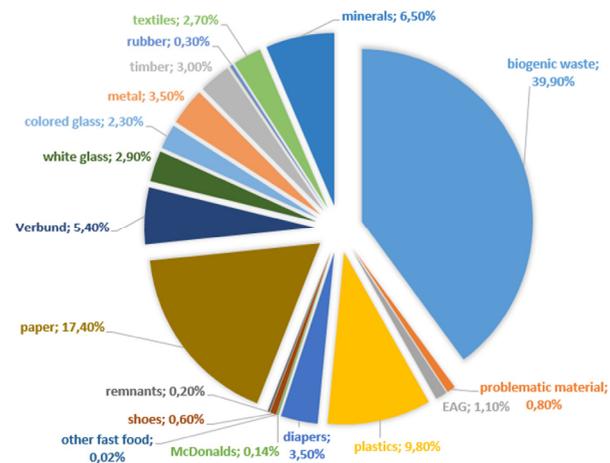
1991 – 2015 (tons/year)



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## Composition Residual Waste (2009)

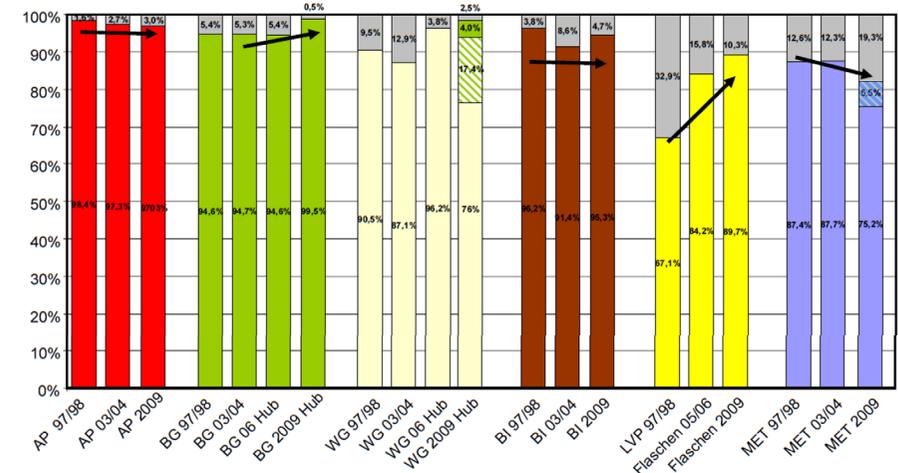
BACK



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## Development of the incorrect sorting share

BACK



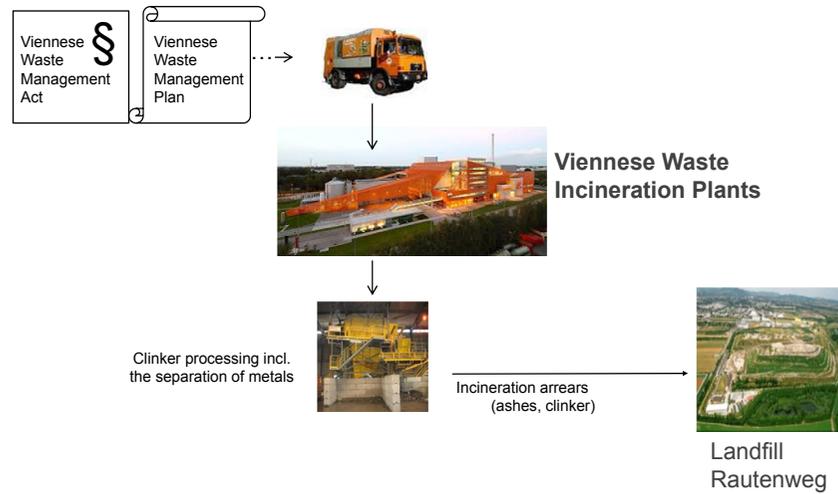
Quelle bis 2006: Wr. AWK

Getöntes Weißglas EAG



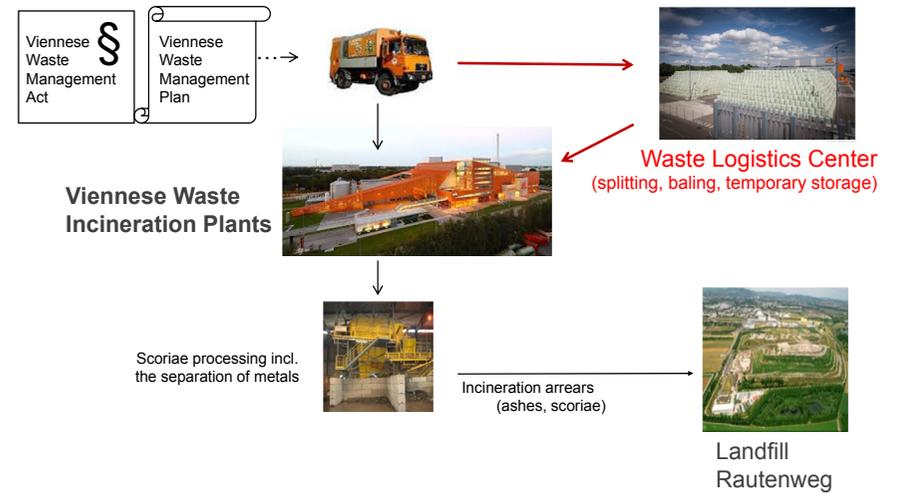
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## Vienna: The whole waste disposal chain in the city's hand – example residual waste



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## Vienna: The whole waste disposal chain in the city's hand – example residual waste



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## Viennese Waste Incineration Plants (MVA)

BACK



**MVA I**  
Flötzersteig 1963  
200.000 t/year  
District heating Vienna



**MVA II**  
Spittelau 1971  
250.000 t/year  
District heating Vienna



**MVA III**  
Pfaffenau 2008  
250.000 t/year  
WKU



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## Incineration remains

During the incineration process **1 t of household waste** produces:

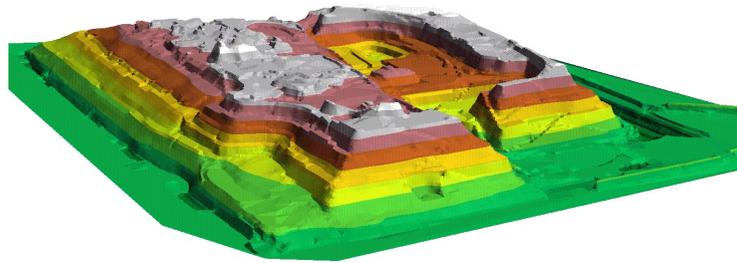
clinker and gypsum	-	approx. 240 kg
ashes	-	approx. 17 kg
scrap metal	-	approx. 22 kg
filter cake	-	approx. 1 kg

**Reduction by approx. 2/3 of the volume.**



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## Landfill Rautenweg



- Area of 60 ha
- Dumping of the remains of incineration: ashes/clinker
- (before 2009: also waste dump for residual waste)

25



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BACK

## Landfill Rautenweg



26



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## Landfill Gas Usage

- 160 active gas wells
- length of gas lines: ca. 10 km
- landfill gas production 2012: 3.534.924 m<sup>3</sup>
- average methane content 2012: 42,1 %
- electricity production: 5.259.150 kWh  
- corresponds to the electricity consumption of approx. 2.100 households  
(average electricity consumption of 2.500 kWh per household)



27

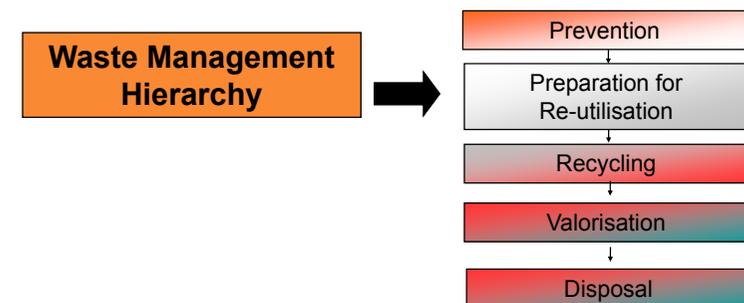


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## Waste Prevention according to EU – WFD (Waste Framework Directive)

BACK

- Within the 5-step waste hierarchy of the WFD waste prevention is the utmost priority.



- Objectives for waste prevention are to be set

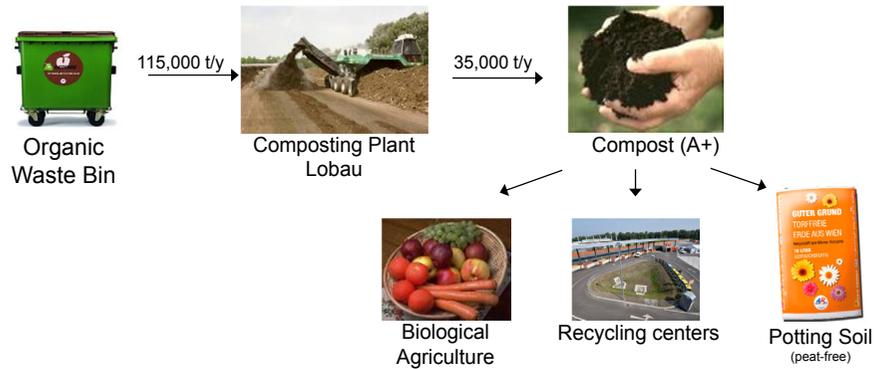
26



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BACK

# Circular Economy in Vienna Example: Organic Waste



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# Circular Economy in Vienna Example: Organic Waste



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# Waste Utilisation – Paper

BACK



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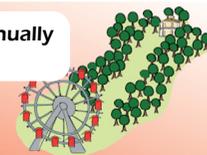
BACK

in Vienna **130 000 tons** of waste paper are collected annually  
this saves timber of a forest the size of the Viennese Prater



**77 KG**  
amount collected per  
inhabitant per year

= 72



in Vienna **25 000 tons** of waste glass are collected annually  
from that, it is possible to produce 46 million new glass bottles  
this corresponds to the distance from Madrid to Athens



**15 KG**  
amount collected per  
inhabitant per year

= 28



in Vienna **5 500 tons** of plastic bottles are collected annually  
from that, it is possible to produce 143 million new plastic bottles  
this corresponds to a third of the circumference of the earth



**3,3 KG**  
amount collected per  
inhabitant per year

= 86



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## Example for Optimisation: Collection of Plastics

BACK

- Start of extensive separate collection at the end of the 80ies
- Hollow container collection „Kermit“ since 2005



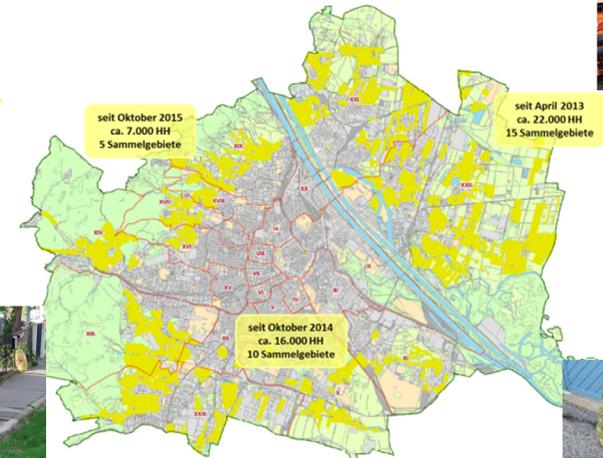
- Collection of wrappers and other plastic packaging of business establishment with ARA number – point of origin service
- 240, 770, 1.100 litres containers (discharge: daily to every 2 weeks)
- Bag collection of plastic hollow containers: 44.000 households



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## Example for Optimisation: Collection of Plastics

BACK

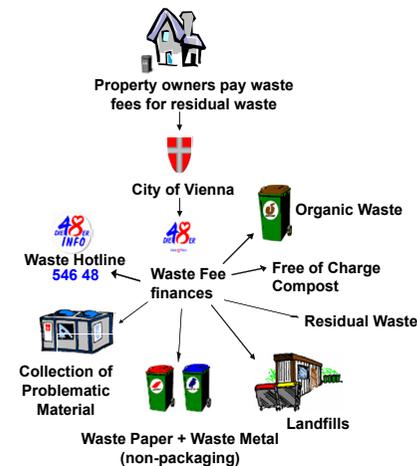


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## Financing

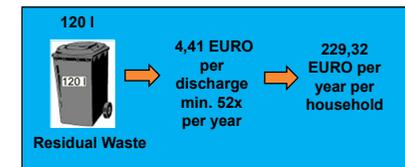
- Residual Waste
  - Problematic Material
  - Organic Waste
  - Waste Material (non-packaging)
- **Waste Fee**  
(charged for residual waste)
- **Revenues from remains**
- Packaging Waste
- **full responsibility by producers**
- WEEE (E-Waste)
  - Batteries
- **shared responsibility of producers**

## Financing of Waste Management



The fee for residual waste is calculated according to the size of the container and the discharge rate.

Example:



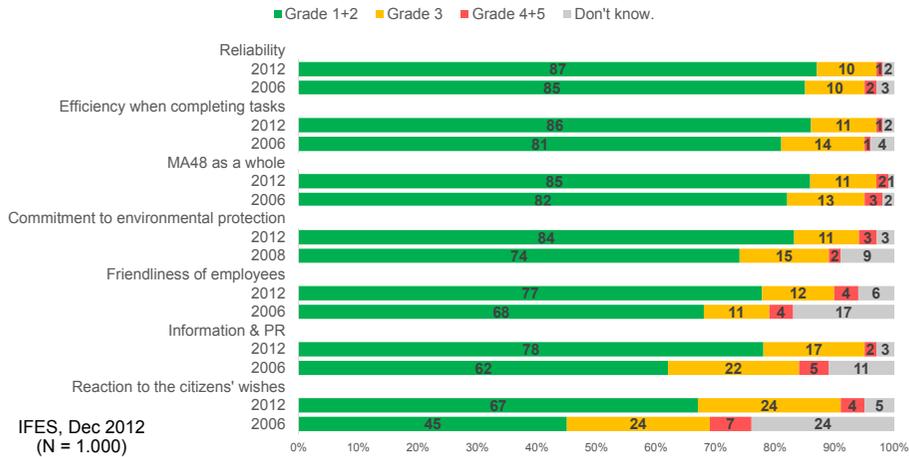
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## Satisfaction with Service by the Viennese Population

Question: How do you rate the MA48 in the following areas? Use the grades 1 (very good) to 5 (very bad). In percent.



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Thank you for  
your attention!

[martina.ableidinger@wien.gv.at](mailto:martina.ableidinger@wien.gv.at)



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**Viennese Municipal Environmental  
Protection Corporation**  
(Wiener Kommunal-Umweltschutzprojektgesellschaft mbH)

a company of the  
City of Vienna, MA48



the WKU is a technical planning office.  
the know-how of WKU encompasses the following areas:

- Thermal processing of residual waste
- Sewage plants
- Biogas plants
- Animal shelters, motorik parks
- Waste management facilities
  - Waste dumps (recycling centers)
  - Waste container washing systems
  - Sorting plants
  - Clinker processing
  - Composting plants

**Container Logistics Center of MA48**  
(Municipal Department for Waste Management)



**Animal Quarter Vienna (TierQuarTier Wien)**



Motorik park Vienna (Motorikpark Wien)



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Recycling center (Waste Dump) Auhof



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Waste Incineration Plant (MVA) Pfaffenau



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MVA Pfaffenau Project Presentation WKU

- Introduction
- Location
- Design data
- Plant concept
- Energy management
- Flue gas treatment
- Remnants and residues
- Infrastructure and exterior installations

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## MVA Pfaffenau Basics



- Project Solicitor WKU
- Strategic Environmental Assessment / Viennese Waste Management Plan
- Waste Dump Regulation

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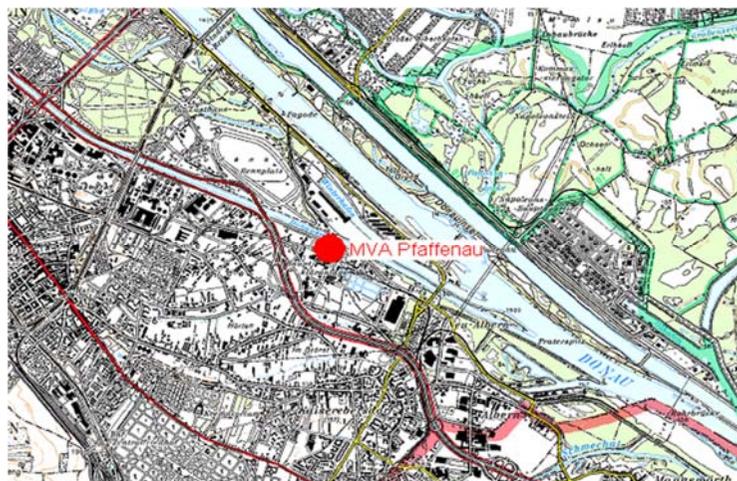
## Tasks / Objectives of the MVA Pfaffenau



- processing of 250.000 t/y residual waste
- resilient & secure technology
- high environmental standards
- high energy use

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## MVA Pfaffenau Location



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## Roadmap MVA Pfaffenau



- |                     |                   |
|---------------------|-------------------|
| • Basics study      | 07/2002           |
| • Basic engineering | 07/2002 – 06/2003 |
| • Permissions       | 03/2004 – 03/2005 |
| • Placings          | 10/2005           |
| • Construction      | 01/2006 – 05/2008 |
| • Pilot operation   | 06/2008 – 09/2008 |
| • Full operation    | 09/2008           |

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## 5 Placing lots



- Construction PORR
- Furnace ALSTOM
- Water-Steam-System SIEMENS
- EMSR (Instrumentation and Control Engineering) ABB
- Flue gas treatment Integral
- Total costs (incl. biogas plant) 225m €

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## MVA Pfaffenau Location



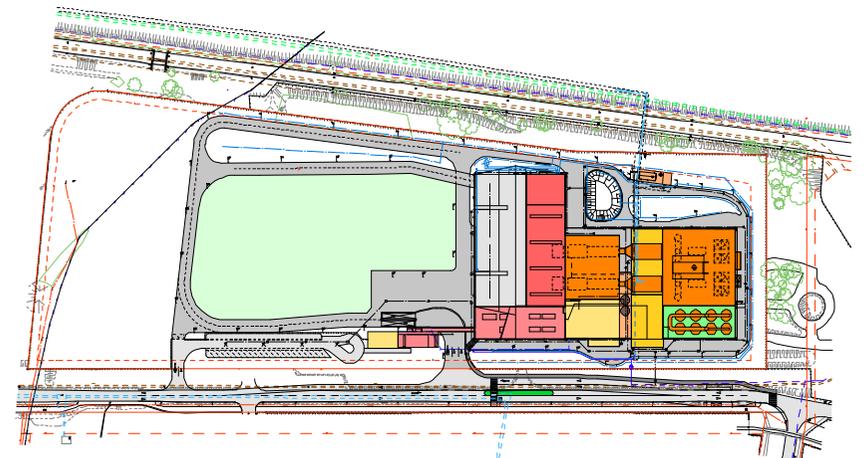
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## MVA Pfaffenau Road Network



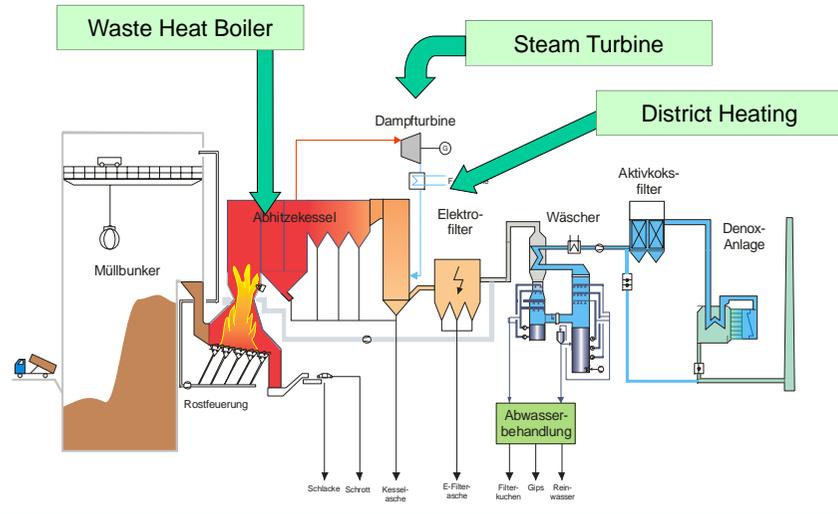
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## MVA Pfaffenau Plant Layout



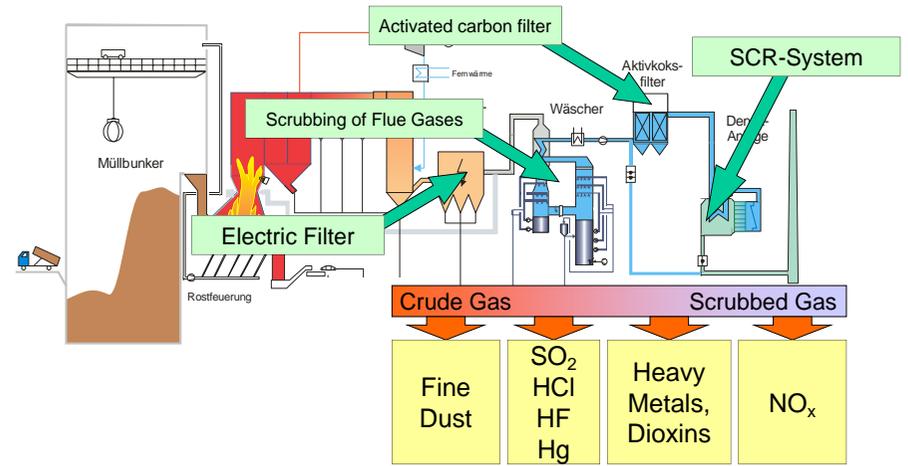
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# MVA Pfaffenau Energy Management



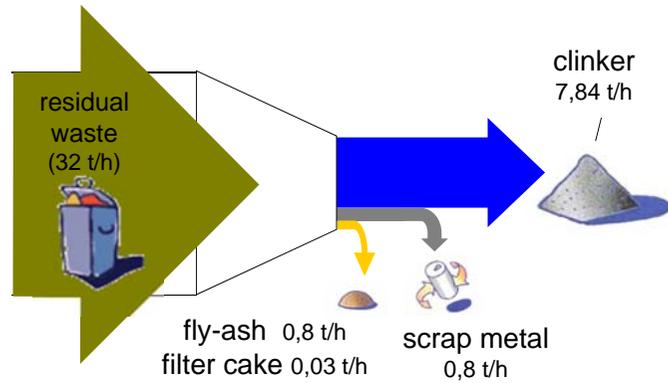
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# MVA Pfaffenau Flue Gas Treatment



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# Remnants and residues



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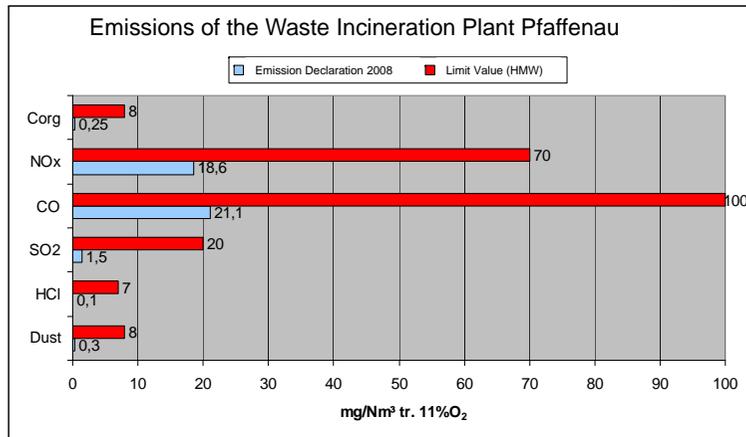
# Output 2011



- Energy 68.060 MWh 2,957.238 €
- Heating 392.349 MWh 7,775.127 €
- Waste Metal 4.073 t 590.418 €

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## Emissions



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## Waste Incineration Plants for Residual Waste in Vienna

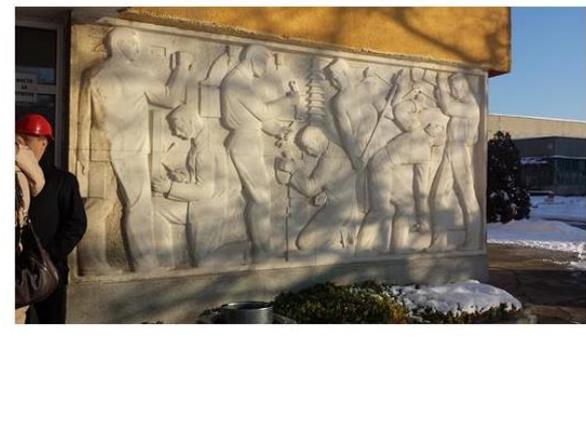


- MVA 1: Flötzersteig 200.000t
- MVA2: Spittelau 250.000t
- MVA3: Pfaffenau 250.000t
- WSO4 80.000t
  
- Total 780.000t

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### 7.3 Photo documentary of the workshop (flip charts, picture collage)





## 7.4 Topics of particular interest for Sofia stakeholders

### **On the operation of a waste incineration plant:**

- Principles laid down in preparation of perspective investment projects – in short term and long term aspect for future large-scale modernization.
- Condition and type of the generating capacities in the heat sources – distribution according to the used fuel, energy efficiency and environmental impact.
- Emission norms and measures for compliance with statutory set limits.
- Condition of the facilities for transmission and distribution of the heat energy – losses in transmission and distribution.
- Principles for realization of heat supply regimes (quality, quantity or mix), degree of process atomization and implementation of operational management (availability of overall dispatch control).
- Principles and optimal way for realization of supporting electricity generation (combined generation) – electricity purchase, tariffs, restrictions, and bonuses.
- Necessary approach practice for covering peak loads – are peak hot water boilers used and on what fuel base.
- Opportunities to recover stabilized organic fractions and residual fractions of MBT (Mechanical Biological Treatment) intended for disposal.
- Contemporary solutions in the field of intensive composting – technological installations for process flow, equipment, the effectiveness and the efficiency of the time-reduction of biological processes; the opportunities for automation of the processes and the achievement of high productivity and effectiveness; guaranteeing high quality of the final product.
- Methods for biological stabilization of the remaining fraction for disposal.
- Methods for solving the problems of the constantly rising prices of electrical energy and of staff policies of the enterprise for energy effectiveness.

### **On planning, engineering and construction of a waste incineration plant (with RDF utilization):**

- Investment project implementation – planning, feasibility, financing and technical provisions.
- The accepted solutions for utilization of RDF for combined heat and electricity production, to what extent correspond to the hierarchy of activities for waste management, according to the Frame Directorate 2008/98/EU for wastes – waste utilization and energy recovery?
- With realization of so presented solutions for the CHP plant with RDF utilization, whether the main goal of the project for realization of sustainable waste management system in Sofia Municipality is fulfilled, better resource efficiency and ecological effect in regional and national scale is achieved?
- What is the opinion of Vienna experts: Do the applied technical solutions contribute for the achievement of high level of energy efficiency; meet the objectives for resource efficiency, stated in Strategy 2020?
- Does the CHP Plant on RDF allow security improvement of energy supplies in periods, when there is significant political risk related to natural gas import?
- Does the project implementation correspond to the European legislation, defined by EU legal documents in force for environmental protection?
- Opportunities for energy recovery of Refuse Derived Fuel (RDF) and waste as a whole.

### **On municipal waste management:**

- Organization for energy utilization of municipal solid waste:
  - a. -content of municipal solid waste - by nature, elements and physical-chemical content;
  - b. -seasonal alterations in the content – by structure humidity, quantity and calorificity;
  - c. -organization for waste supply up to the installation for utilization;
  - d. -storage and pre-processing for utilization;
  - e. -technical indicators of the installations for municipal waste utilization;
  - f. -applied technology for waste utilization – restrictions in order to avoid generation of dioxins, furans, and other gases, polluting the environment;
  - g. -residue from utilization treatment – ashes, slag, pollutant waters;
    - contamination monitoring and control;
  - h. -environmental norms for pollution and implied sanctions;
  - i. -typical peculiarities of the technological regimes by waste utilization;

- j. -necessity of stabilizing fuel – when and with what percentage of participation;
  - k. -specific indicators for electricity and heat production – kg.r.f./ kW<sub>e</sub> and kg.r.f./ kW<sub>t</sub>
  - l. -summary data for investment (EURO/installed MW), consumables and operating costs.
- Presentation of overall waste collection process in Vienna.
  - m. Costs for collection, cost for distribution between external services and MA 48, cost for households etc.
  - n. Waste fee system of Vienna
  - o. Structure of MA 48
- Modern concepts for waste management and recovery of waste materials through recycling.
- A legislative policy both on a local and a national scale with the goal of promotion of the measures for waste reduction, recycling and recovery; methods for accomplishing these measures (through fee/tax regulation and other financial instruments regulation), as well as the results from these measures, leading to the preservation of natural assets, resources, the environment and general health; promotion, advertisement and online public awareness of information, related to providing services to such enterprises.
- Human resources management
  - Recruitment
    - What should be the personnel's level of education (Head of work shifts, Warehouse keepers, Construction foremen and machine operators) be?
    - Is it necessary for the personnel to have previous work experience in the field?
    - What are the most optimal strategies for personnel motivation and work capacity development?
    - How should the personnel motivation methods be structured?
    - What events should be considered for increasing the personnel's qualification?
    - What should the personnel number be for the adequate upkeep of such an installation?
    - Measures for increasing qualification.
    - Opportunities for professional development of the personnel responsible for production.
    - Opportunities for professional development of the personnel responsible for machine and facility maintenance.

### **On district heating:**

- Presentation of Vienna District Heating – organizational structure, subordination and commitments to Vienna Municipality. Operating regimes, conducting activities for efficiency enhancement and as well the necessity of future modernization are topics of interest.
- Diagram for distribution and provision of heat load – in year, season and day aspect – according to the available generating capacities.
- On the base of Vienna District Heating experience, presentation of guidelines and recommendations for the way of determination of price levels of products and activities related to the operation:
  - p. -price of municipal waste for utilization;
  - q. -natural gas price, liquid and alternative fuels (biomass, pellets, and others);
  - r. -price of produced heat energy – hot water and steam;
  - s. -price of produced supporting electricity;
  - t. -permits and fees for the activity;
  - u. -regulatory body for price control;
  - v. -applied methodology for price formation.

### **On RDF (Refused Derive Fuel)**

- Is there an Austrian legal act which regulates the methods of analysing RDF or are they regulated by international standards for the analysis of such types of waste?
- How is the produced RDF analysed - in an independent laboratory or an external one? If the laboratories are independent, do they receive credit or are they used only for technological needs?
- Is waste being classified as hazardous in case such materials are discovered in the mixed municipal waste or is it handed over with a common code in accordance to international waste classification?

### **On work safety:**

- Do the Austrian institutions offer opportunities for additional personnel training on health and safety (including staff members); what kind of training?
- Are Geiger counters installed in RDF-production facilities (like in certain cement plants) to make sure there is no radiation in the waste?
- Examples of good available practices for securing the facilities during maintenance?
- How the safety rules are made accessible for personnel with lower levels of education?
- How are the safety and health regulations being enforced - through methods of encouragement and punishment?

## 7.5 Press and media coverage of the workshop



ein unternehmen der **wienholding**

# PRESSECLIPPINGS

BG-Capa City-Urban Competences

29. November 2016 – 1. Dezember 2016



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## Bulgarien

**Sofia.bg, Sofia, 29.11.2016**

### Sofia und Wien tauschen sich zu Umweltpolitik aus

#### Wien Energie-Experten beraten Experten der Gemeinde Sofia

Wien Energie-Experten beraten die Experten der Direktion "Abfallmanagement" der Gemeinde Sofia zum Thema "Nutzung des Abfalls als Ressource". Die Expertenunterstützung wurde während des Treffens der Sofioter Bürgermeisterin Jordanka Fandakova mit dem Wiener Bürgermeister Michael Häupl im März dieses Jahres vereinbart. Während des Arbeitstreffens präsentierten die Sofioter Umweltexperten die Ergebnisse des Projekts zur Errichtung eines integrierten Anlagensystems zur Verarbeitung von Hausmüll in der Gemeinde Sofia. Nach der Inbetriebnahme der Müllverarbeitungsanlage wurden 296.000 t Abfall verarbeitet, daraus wird Brennstoff erzeugt und es werden wiederverwertbare Stoffe wie Papier, Glas und Kunststoff gewonnen. Seit Beginn der Arbeit der Biomüllverarbeitungsanlage bis dato wurden 4.222 MWh Energie erzeugt.

[http://sofia.bg/pressecentre/press.asp?open=10&sub\\_open=91344&nxt=0](http://sofia.bg/pressecentre/press.asp?open=10&sub_open=91344&nxt=0)



**София и Виена обменят „зелени политики“**  
29.11.2016 г.

Експерти от Виенската енергийна агенция консултират столичните експерти от дирекция „Управление на отпадъците“ по проблемите на използването на отпадъците като ресурс. Експертната помощ бе договорена по време на срещата на кмета на София Йорданка Фандъкова с кмета на Виена Михаел Хойпл през март тази година.

По време на работната среща софийските специалисти в сферата на околната среда представят резултати от проекта „Изграждане на интегрирана система от съоръжения за третиране на битовите отпадъци на Столичната община. След пускането на завода за МБТ са преработени над 296 хиляди тона отпадъци, от които са произведени гориво и се извличат рециклируеми отпадъци като хартия, стъкло и пластмаси. От въвеждането в експлоатация до настоящия момент от работата на инсталацията за преработка на зелени и хранителни отпадъци е произведена 4 222 MWh енергия.



**Dir.bg, Sofia, 30.11.2016**

**Sofia und Wien tauschen sich zu Umweltpolitik aus (ident)**

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**Wien Energie-Experten beraten Experten der Gemeinde Sofia**

<http://novini.dir.bg/news.php?id=24626351>



### **София и Виена обменят „зелени политики“**

**БългарияУтре - 30 Ноември 06:30**

**Експерти от Виенската енергийна агенция  
консултират столичните експерти**

Експерти от Виенската енергийна агенция консултират столичните експерти от дирекция Управление на отпадъците по проблемите на използването на отпадъците като ресурс. Експертната помощ бе договорена по време на срещата на кмета на София Йорданка Фандъкова с кмета на Виена Михаел Хойпл през март тази година. По време на работната среща софийските специалисти в сферата на околната среда представят резултати от проекта Изграждане на интегрирана система от съоръжения за третиране на битовите отпадъци на Столичната община. След пускането на завода за МБТ са преработени над 296 хиляди тона отпадъци, от които са произвежда гориво и се извличат рециклируеми отпадъци като хартия, стъкло и пластмаси. От въвеждането в експлоатация до настоящия момент от работата на инсталацията за преработка на зелени ...

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**Sofia.utre.bg, , 30.11.2016**

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[http://www.sofia.utre.bg/2016/11/30/402540-sofia\\_i\\_viena\\_obmenyat\\_zeleni\\_politiki](http://www.sofia.utre.bg/2016/11/30/402540-sofia_i_viena_obmenyat_zeleni_politiki)

## София и Виена обменят „зелени политики“

30 ноември 2016, 06:30 | Мила Иванова

f Харесва



### Експерти от Виенската енергийна агенция консултират столичните експерти

Експерти от Виенската енергийна агенция консултират столичните експерти от дирекция „Управление на отпадъците“ по проблемите на използването на отпадъците като ресурс. Експертната помощ бе договорена по време на срещата на кмета на София Йорданка Фандъкова с кмета на Виена Михаел Хойпл през март тази година.

По време на работната среща софийските специалисти в сферата на околната среда представят резултати от проекта „Изграждане на интегрирана система от съоръжения за третиране на битовите отпадъци на Столичната община. След пускането на завода за МБТ са преработени над 296 хиляди тона отпадъци, от които са произвежда гориво и се извличат рециклируеми отпадъци като хартия, стъкло и пластмаси. От въвеждането в експлоатация до настоящия момент от работата на инсталацията за преработка на зелени и хранителни отпадъци е произведена 4 222 MWh енергия.

*Sofijski vestnik, , 01.12.2016*

Sofia und Wien tauschen sich zu Umweltpolitik aus (ident)

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## София и Виена обменят „зелени политики“

Експерти от Виенската енергийна агенция консултират столичните експерти от дирекция "Управление на отпадъците" по проблемите на използването на отпадъците като ресурс. Експертната помощ бе договорена по време на срещата на кмета на София Йорданка Фанджова с кмета на Виена Михаел Хойпл през март тази година.

По време на работната среща софийските специалисти в сферата на околната среда представят резултати от проекта "Изгражда-

не на интегрирана система от съоръжения за третиране на битовите отпадъци на Столичната община". След пускането на завода за МБТ са преработени над 296 хиляди тона отпадъци, от които са произвежда гориво и се извличат рециклируеми отпадъци като хартия, стъкло и пластмаси. От въвеждането в експлоатация до настоящия момент от работата на инсталцията за преработка на зелени и хранителни отпадъци е произведена 4 222 MWh енергия.

(Пресцентър на СО)

