

امحاء پسماند شهری با پیشرفته ترین تکنولوژی آلمانی و تولید  
MYT<sup>®</sup> Maximum Yield Technology  
انرژی برق از استحصال آن در کلانشهر تبریز



S.T.G



# خلاصه گزارش فنی – اقتصادی و نکات تصمیم ساز

در خصوص تکنولوژی روز کشور آلمان در حوزه امحاء زباله  
و تولید انرژی به روش :



## The MYT Plant

تکنولوژی مناسب برای زباله های جامد شهری تفکیک نشده

Municipal Solid Waste (MSW)

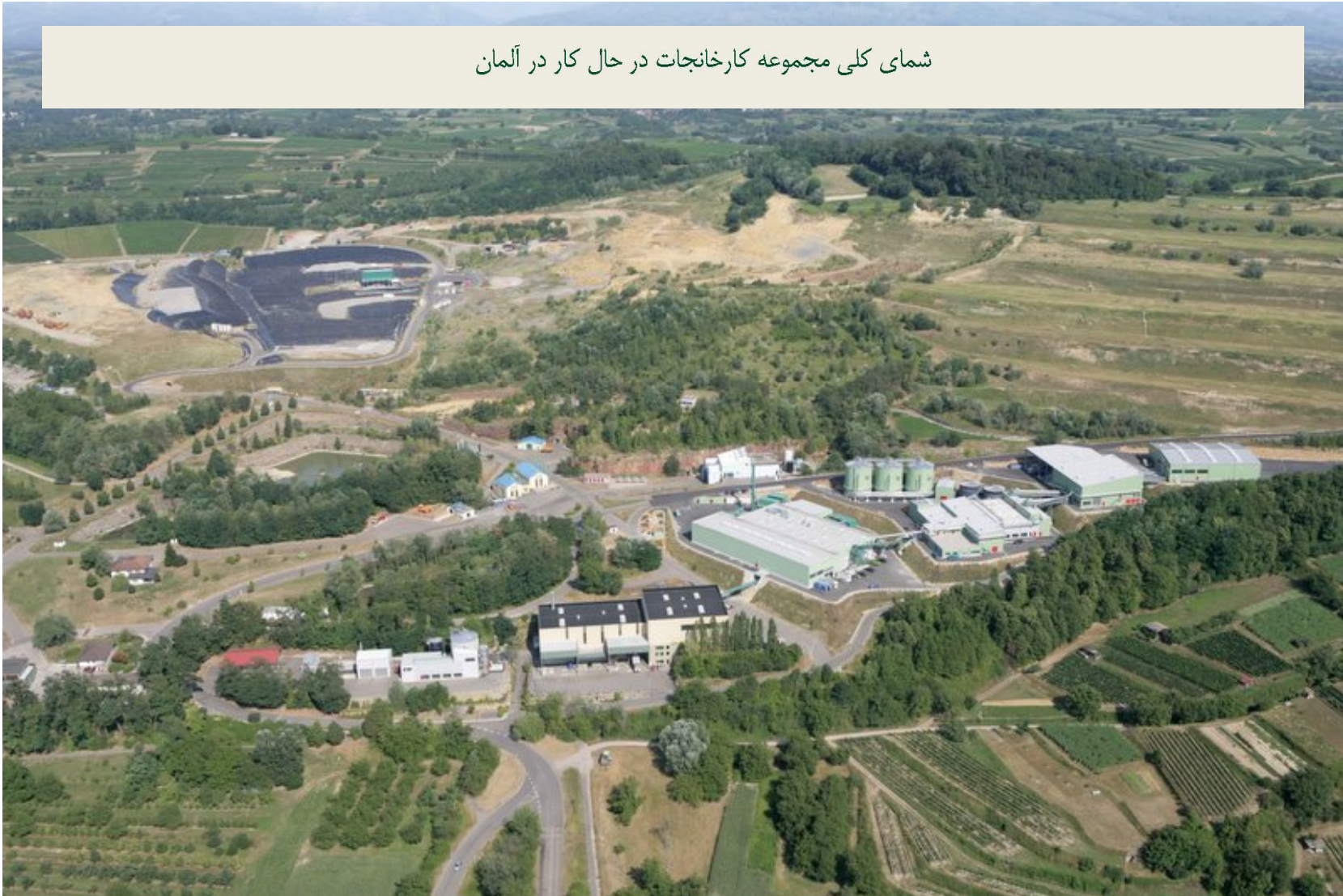


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- A- معرفی مختصر مجموعه در حال کار با تکنولوژی MYT در آلمان به همراه پخش تیزر
- B- معرفی شرکت آلمانی Recontec : با تاکید بر موقعیت سرکار خانم دوران مدیرعامل شرکت بعنوان مشاور عالی محیط-زیست در دولت آلمان و تأییدیه شرکت Recontec توسط وزارت امور خارجه ایران در آلمان و سازمان بازرگانی آلمان
- C- رفرنس تکنولوژی MYT در شهر بانکوک کشور تایلند با ۸۰۰ تن زباله در روز و تأییدیه موسسه Giz آلمان و دفتر محیط-زیست سازمان ملل در بانکوک ( جدیدترین مجموعه مورد بهره برداری )- دفترچه پیوست
- D- مقایسه تکنولوژی MYT با زباله-سوزهای رایج مشابه پیشنهاد شرکت CNIM برای تبریز
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دستور مستقیم ریاست محترم سازمان حفاظت محیط-زیست کشور جهت حمایت کامل و مساعدت  
نامه استفاده از تسهیلات صندوق ملی محیط-زیست کشور  
تاکید فراکسیون محیط زیست مجلس بر تکنولوژی و حمایت های معنوی
- F- معرفی شرکت و خلاصه گزارشات تصویری سیر اقدامات:  
نماینده انحصاری شرکت Recontec در ایران  
گواهینامه پایه یک انبوه-سازی - صلاحیت پیمانکاری از سازمان برنامه و بودجه کشور  
سوابق اجرایی در سرمایه گذاری اعم از پروژه بازار بزرگ چرم تبریز به زیربنای ۳۰ هزار مترمربع و پروژه چهارراه شهید بهشتی تبریز (پرنیان) به زیر بنای ۲۰ هزار متر مربع  
گواهی (CERTIFICATE) مدیریت پسماند از موسسه QAL انگلستان و اسپانسرری اجلاس مدیریت پسماند ایران و آلمان  
سابقه شرکت در کلیه فراخوان-های جذب سرمایه-گذار برای امحاء زباله شهری (تبریز، تهران، آمل، مشهد ارومیه، زنجان، صفادشت و ملارد، مراغه و کرج)  
تفاهم-نامه-های مبادله شده شرکت با شهرداری-های ارومیه، زنجان، صفادشت و ملارد، مراغه و کرج  
شرکت در جلسات متعدد با شهرداری-ها و استانداری های استان-های مختلف در راستای دعوتنامه ارسالی آن-ها
- \*خلاصه گزارش تصویری از جلسات مشترک با شریک آلمانی و صاحبان صنعت در آلمان
- \*خلاصه گزارش تصویری از جلسات مشترک با نمایندگان محترم مجلس، دولت و سازمان-ها و ادارات ایرانی ، مقامات و بانک وام دهنده و مسئولین در استانها



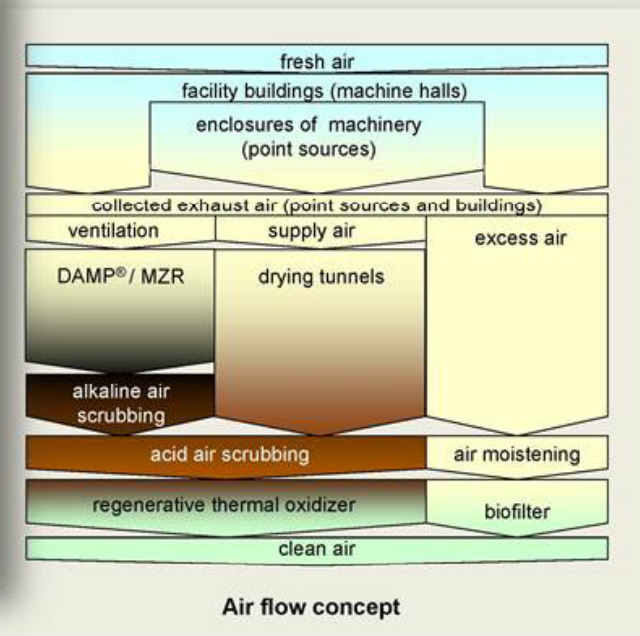
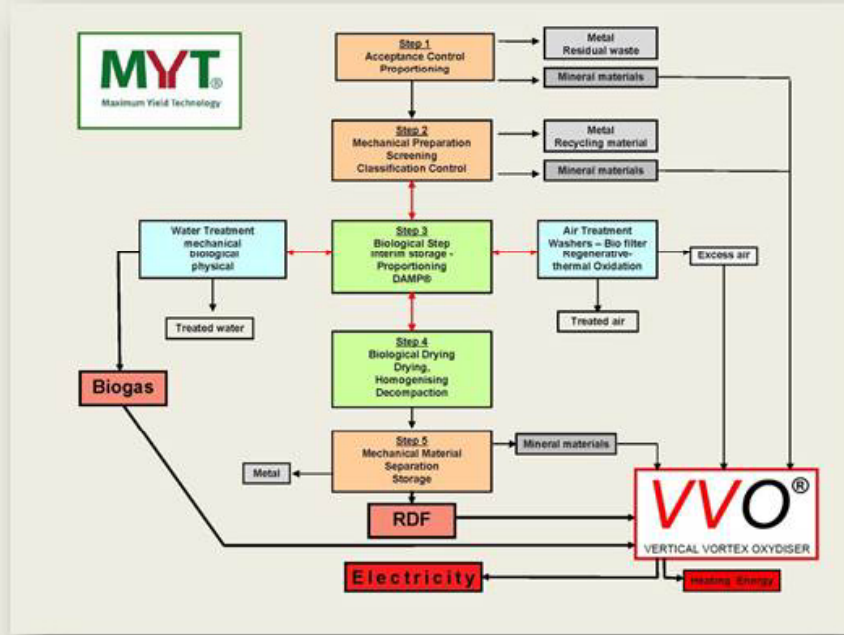
شمای کلی مجموعه کارخانجات در حال کار در آلمان



The grounds of the ZAK waste valorisation plant



کلیات تکنولوژی MYT و سیستم تصفیه هوا در آن ( رفع کامل بوی بد زیاله



تصویر هوایی پروژه جدید MYT در باتکوک با واحدهایی همسایگی مسکونی که نشان دهنده میزان پاک بودن و حداکثر سازگاری با محیط زیست است







## MYT<sup>®</sup> Maximum Yield Technology

## MYT<sup>®</sup> Maximum Yield Technology

extracts the maximum energy  
and raw material potential  
from residual household waste

MYT<sup>®</sup> Business Unit

Zweckverband Abfallbehandlung Kahlenberg (ZAK)  
(Kahlenberg Waste Treatment Association)

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Discover MYT<sup>®</sup>– the new,  
innovative waste treatment  
technology from **Zweckverband  
Abfallbehandlung Kahlenberg (ZAK)**  
(Kahlenberg Waste Treatment  
Association)





## MYT. Maximum Yield Technology

- ..... is a mature and operationally reliable technology. All the process steps are tried, tested and completely compatible with one another.
- ..... is energy self-sufficient and virtually emission-free.
- ..... is flexible and its modular set-up allows it to adapt to changing conditions.
- ..... helps protect raw fossil fuel resources, avoids climate-harmful emissions and makes a significant contribution to the environment.
- ..... is a sound and targeted further development of the "ZAK" process that has already proven itself in practice, even as a large-scale technology
- ..... treats waste, extracting energy and raw materials from it.



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The inventor: *Zweckverband Abfallbehandlung Kahlenberg*



## ZAK is developing the new, innovative procedure for waste treatment

The Kahlenberg Waste Treatment Association: *Zweckverband Abfallbehandlung Kahlenberg (ZAK)* is a public company, supported by the counties of Ortenau and Emmendingen. ZAK has spent 40 years working intensively in the area of waste treatment.

Our many years of experience in dealing with waste, and our continuous search for solutions to the complex problems related to its treatment, help us to develop modern and innovative technologies.

Since 1996, we have been working on mechanical biological treatment (MBT) technologies with the aim of breaking waste down into usable components, as opposed to landfill or incineration solutions.

After a number of large-scale technical pilot projects, the new, patented „ZAK process“ was developed in 2003 and went operational for the first time with the „Kahlenberg (ZAK) MBT Plant“ project in 2006.

The „Kahlenberg (ZAK) MBT Plant“ is operationally reliable and treats over 100,000 tonnes of residual household waste a year.

**Our continuing Maximum Yield Technology – MYT® development draws on the experience of our very successful operations in the past.**

*Our know-how is based on over 40 years of experience in disposal and waste treatment.*

*ZAK, with MYT® extracts the maximum energy potential from residual household waste.*





## MYT extracts the maximum raw material and energy potential from residual household waste

Maximum Yield Technology is a new, innovative process for treatment and utilisation of residual household waste.

MYT® aims to extract the complete raw material and energy content of waste and to use the energy potential as recyclable sources of energy. Instead of landfill or incineration solutions, there is now the option of optimum economic exploitation of waste in the form of raw materials, quality-assured fuels and energy-rich biogas.

### Waste is made up of the same components world-wide.

Although residual household waste varies on a regional and international level, the essential components of waste are the same the world over.

MYT® breaks waste down into its four components, treats them according to their specific material and extracts the maximum potential from them.



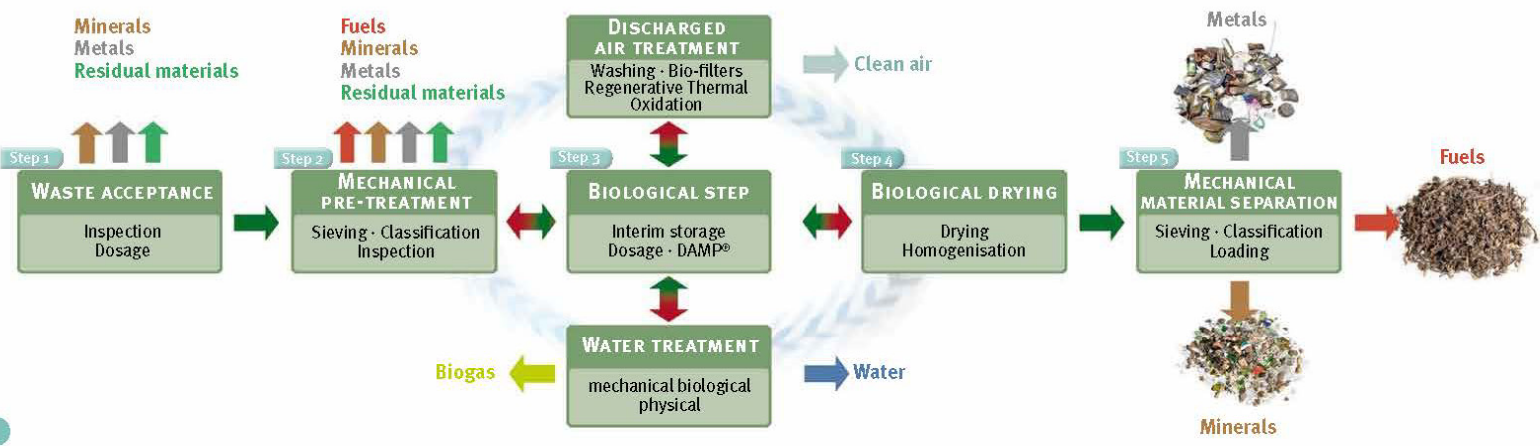
### Waste contains:

- Energy sources (fuels, biogas)
- Minerals
- Water
- Metals





Completely compatible steps:  
economical, operationally reliable, low in emissions





### Waste acceptance

Waste acceptance takes place in a hall. A first inspection selects large unwanted materials and potential recyclables hidden in the waste, which are subsequently recycled or disposed of. The inspected waste is continually fed to the mechanical processing step. The waste acceptance area is set up simply and works efficiently.



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*Large unwanted materials are removed, recycled or disposed of*

### Mechanical pre-treatment

Mechanical pre-treatment breaks the waste down automatically into individually defined fractions, according to the material and differences in size. The concepts and aggregates used are based on ZAK's years of experience. They ensure secure operations and targeted separation of fuels, minerals, metals and the few non-recyclable residual materials contained in the waste.

*Coarse grade minerals are already extracted and recycled at the first step.*



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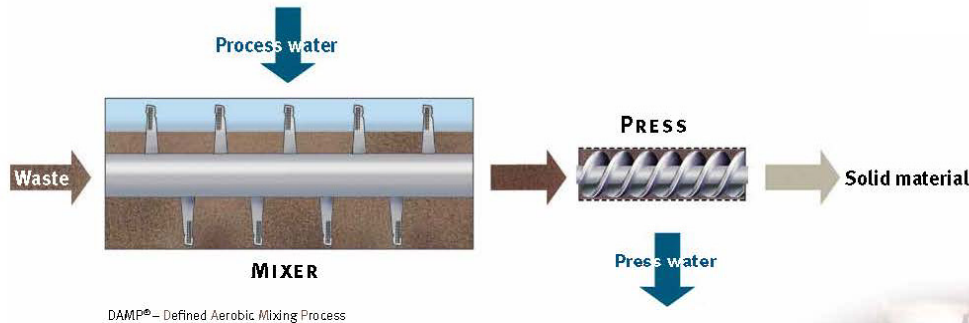


### Biological step

The “biological step” ensures particularly efficient and stable process flows. Simple and robust aggregates guarantee maximum operational security at simultaneously low investment and operational costs.

Interim storage permits a flexible and consistent dosage for biological process steps. The targeted reproduction of micro-organisms ensures high-level and constant biological activity. This results in ideal process conditions and optimised energy processes, even allowing for seasonal variations in temperature and fluctuations due to waste collection logistics.

In the new and intensively-tested DAMP® process – Defined Aerobic Mixing Process – the waste is selectively reduced in size and homogenised.



Added process water – circulated water – ensures appropriate and uniform consistency. After a short retention time in the mixer, presses dewater the solid material which is ideally prepared for biological drying.

The new DAMP® process leaves microbially convertible organic materials in the solid material. This ensures its optimised drying. The resulting press water is treated in several steps for energy extraction and cleaning.

*View of the agitator arm in the aggregate for the new DAMP® process: microbially-convertible organic materials remain in the solid material, thus optimising the next step of biological drying.*





## Biological drying

Biological drying in the MYT® procedure dries the waste in an energy-efficient and economical way with the energy inherent in the waste.

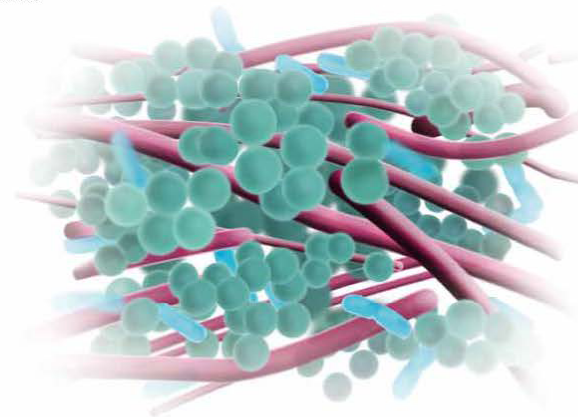
In tightly-closed concrete tunnels, air flows through the waste evenly and provides the micro-organisms with oxygen. The micro-organisms feed on organic components and produce thermal energy. This thermal energy evaporates the water contained in the solid material.

After a short treatment time, a homogenous, dry and free-flowing solid material is produced. The dried solid material can be easily broken down into its components: energy sources, minerals and metals.

The biological drying concept developed by ZAK on the basis of a series of tests and years of experience works efficiently and is reliable in practice. Intelligent concepts facilitate the inspection and easy maintenance of the closed aggregates. The comprehensive enclosure reduces emissions and leads to clean working conditions.

Biological drying contributes another important component to the MYT® procedure, along with the special management of air, solid material and energy.

*Micro-organisms produce biogas, clean the air and water, and also dry out the waste.*





## Mechanical material separation

Mechanical material separation works fully automatically with a specially configured technology: sieving and classification systems break down the dry, very homogenous and free-flowing material into various sub-fractions.

With differentiated materials handling, the energy-rich fuels, minerals and the few remaining metals flow into the loading stations.

### MYT® fuels

The composition of the energy-rich fuels is defined as follows: grade size range, chemical composition, heating value and biomass share. These fuels replace fossil-based resources, help to protect the environment and support industry by supplying inexpensive energy.

By producing economical fuels from waste, the MYT® procedure not only makes an important contribution towards the recycling of residual household waste – it also marks a milestone in the supply of alternative energy.

### MYT® minerals

Depending on national and regional requirements and needs the minerals can either be re-used or land filled.

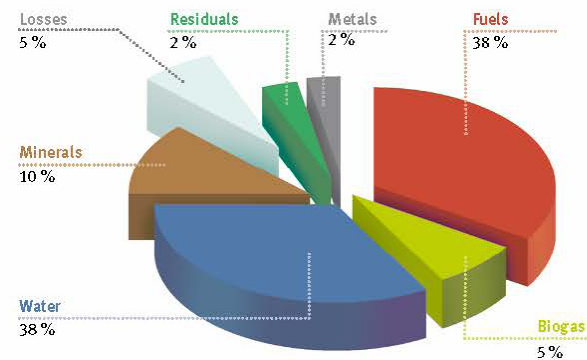
The high quality prevents negative impacts on the environment, even far lower than the strict limits imposed by the German landfill regulations.

*MYT® extracts high-quality fuels and minerals.*

*MYT® produces water, minerals, metals, fuels and biogas from residual household waste. The quantities vary depending on the composition of the waste.*

*MYT® treats residual household waste on a material-specific basis, treats it and maximises the energy and raw material yield.*

**MYT® extracts the following component shares from residual household waste:**





## The multi-level procedure cleans and recycles the process water

Water management constitutes a complex and difficult task as part of the waste treatment process.

Processing conditions for modern, mechanical-biological waste treatment procedures that are stable in the long term require multi-level water treatment concepts and mature water management.

The MYT® technology introduces a new component into the overall water treatment procedure: the “optimised water path”.

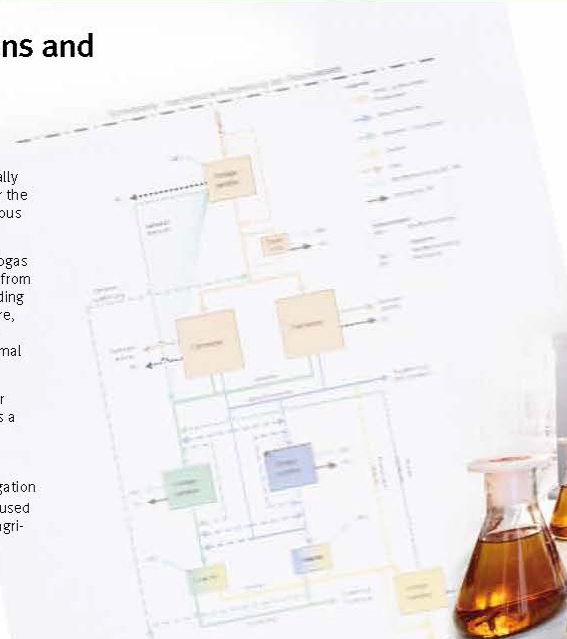
The “optimised water path” is a practice-proven, mature procedure for extracting energy from the process water in which the water is simultaneously cleaned.

The process water from the biological level is mechanically and physically processed for the separation of crude and fibrous materials.

Micro-organisms living in biogas fermenters generate biogas from organic compounds. Depending on location and infrastructure, this can be fully exploited in the form of electric and thermal energy.

At the end of the MYT® water treatment procedure there is a choice of:

- clean water
- water for agricultural irrigation
- nutrient-rich water to be used as liquid fertiliser in the agricultural industry





## Intelligent air management is economical and virtually emission-free

ZAK's discharged air concept is setting standards in waste treatment and waste recycling systems with its differentiated and innovative technologies.

The consistent enclosure for all aggregates, fully completed procedural levels and process steps as well as an intelligent air management concept play a large part in preventing emissions in an economical way.

Polluted discharged air and process air streams are captured in a targeted, individual manner and recycled again. This is how the MYT® process combines economical discharged air treatment with low discharged air volumes.

Discharged air with low-level pollution is fed through humidifiers and bio-filters. This biological procedure enables micro-organisms to clean the discharged air most effectively.

Air washers and a regenerative thermal oxidation system clean more severely polluted process air streams.

**MYT®** is virtually emission free and therefore has no impact on its neighbours.

**MYT®** has no difficulty in meeting the strict regulations applicable in Germany and is well within legal requirements.

**MYT®** creates highly-desirable jobs.

**MYT®** can be operated near residential areas. Even rare plants and animals can live without disruption in the direct vicinity of the plant.





**MYT.**

Future market – bioenergy

## MYT MYT develops residual household waste into an energy resource of the future

MYT® plants are energy-independent and use regenerative energy sources to meet the full range of energy requirements. The MYT® process also takes the maximum energy potential from residual household waste and makes all of it available for further utilisation.

The proven MYT® technology, tried and tested logistics concepts and years of experience gained by different fuel users confirm the success of MYT®'s idea of looking at residual household waste as an energy and raw material resource of the future.

Additional benefits of MYT® energy products include reliable, flexible and needs-based transportability and its economical and environmentally-friendly use.

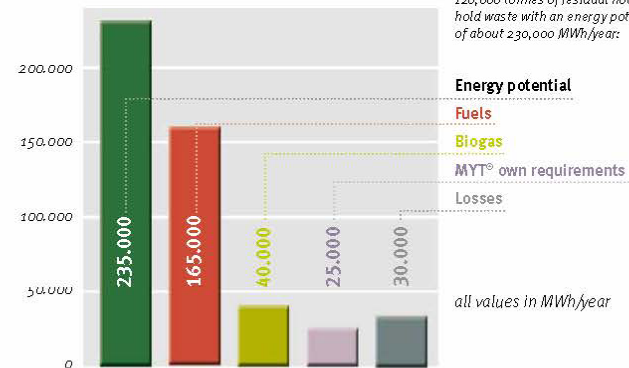
MYT® produces alternative fuels, which – for energy-intensive processes in particular – bring about a significant reduction in the proportion of fossil-based energy sources required.

MYT® produces bioenergy that is used in an economical and environmentally-friendly way.

MYT® produces bioenergy that can be transported reliably, flexibly and to suit needs.

### MYT® energy balance sheet

MYT® extracts the following approximate energy shares from 120,000 tonnes of residual household waste with an energy potential of about 230,000 MWh/year:





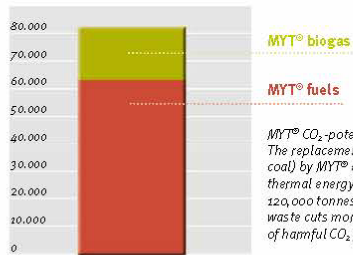
## MYT reduces CO<sub>2</sub>-emissions and benefits from the trade in CO<sub>2</sub>-permits

The MYT® technology extracts biogas and biomass-rich fuels from residual household waste. These energy sources generate electrical and thermal energy that is environmentally friendly.

Electricity generation from biogas is climate-neutral as compared to the electricity mix in Germany. The electrification of biogas reduces CO<sub>2</sub>'s negative impact on the climate.

The MYT® procedure simultaneously produces solid fuels that can be used to replace fossil fuels in power plants. This also prevents emissions of harmful CO<sub>2</sub>'s from primary fossil fuels.

CO<sub>2</sub>-potential saving from MYT® fuels and MYT® biogas



*MYT® CO<sub>2</sub>-potential saving: The replacement of fossil fuels (e.g. coal) by MYT® electrical and MYT® thermal energy from approximately 120,000 tonnes of residual household waste cuts more than 80,000 tonnes of harmful CO<sub>2</sub> per year.*

For power plants involved in permit trading, the use of MYT® fuels offers many ecological and economical benefits.

Half of MYT® fuels consist of biomass. If a power plant replaces a portion of its primary fossil fuels with renewable raw materials, there is a corresponding reduction in the overall emission of CO<sub>2</sub>, impacting the climate. The power plant thus emits less CO<sub>2</sub> than it is entitled to – based on the number of emission permits it has. The power plant can then sell the surplus emission permits for its own gain.





## Answers to questions from practical experience

Our experience tells us that the problems related to waste treatment and the ecological and economic consequences are similar the world over. We would, therefore, like to finish by summarising the various benefits of the MYT® process as a way of answering many of these questions. We would be delighted to personally answer your questions and appreciate your interest in these issues.

### MYT® pays for itself

MYT® works with a simple and efficient waste treatment concept: the small effort required for logistics and separation systems reduces costs and, therefore, waste charges.

The short MYT® treatment time of 10 days in total limits the plant size and reduces investment costs.

Fixed concepts, defined modules and experienced specialist companies guarantee a fast, economical and secure implementation of MYT® projects.

The modular set-up allows for flexibly adaptable sizes of operation: both small and large MYT® plants are economical and operationally reliable.

The flexible choice of location, either in the centre of waste collection areas or in the direct vicinity of the energy consumers, allows economical logistics.

Finally, the raw materials and energy sources extracted in the MYT® process, as well as the CO<sub>2</sub> emission permits saved, are all marketable benefits.

### MYT® is operationally reliable

The modular set-up ensures that all MYT® aggregates are practice-proven. Both large and small plants can be built without risk and operated without disruption.

MYT® operators can benefit from ZAK's practical experience in the form of training and consultancy; they can successfully operate a new MYT® plant in an exemplary manner.

### MYT® is neighbour-friendly

Extremely environmentally-friendly and virtually emission-free technology guarantees the acceptance of locations in the immediate vicinity of residential areas.



## D- مقایسه تکنولوژی MYT با زیاله- سوزهای رایج مشابه پیشنهاد شرکت CNIM برای تبریز



جدول مقایسه روش ها و تکنولوژی های امحاء زیاله به روش MYT آلمان (تولید سوخت ثانوی RDF) و Cnim فرانسه (کوره زیاله سوز) برای ظرفیت ۱۰۰۰ تن روزانه در شهر تبریز

تاریخ تنظیم گزارش: ۱۳۹۹/۱۰-۸

نرخ ارز یورو آزاد در تاریخ تهیه گزارش: ۳۱.۵۰۰ تومان

ردیف	عنوان تکنولوژی	پیش تفکیک	میزان ریجکت	میزان تولید انرژی برق-مگاوات ساعت	مالکیت تکنولوژی	نرخ خرید تضمینی برق بر اساس شرایط (تومان)	درآمد کل ۲۰ ساله از محل فروش برق €	همجواری و سازگاری با محیط زیست	زمین لازم Hec-هکتار	درخواست دریافت فی	سایر درآمدها	قابلیت ذخیره محصول	سرمایه لازم €	ساله IRR ۲۰٪	هزینه نگهداری	بازگشت سرمایه با نرخ های فعلی به سال	
۱	آلمان MYT Reccontec	ندارد	مکزیسم ۵٪	ندارد	ندارد	۳۲	به روز ۸۰٪ ساخت داخل ۲۰٪ وارداتی	۱۳۶۲.۲۳	۱۰۰۰.۳۶۵.۱۳۵	حدود ۱۰	حداکثر	ندارد	دارد	۱۱۰.۰۰۰.۰۰۰	۱۲.۵۰٪	حداقل	۶
۲	فرانسه CNIM	ندارد	۲۰٪	دارد	دارد	۱۸	وارداتی ۱۰۰٪ و بدون انتقال تکنولوژی	۴۳۷.۱۵۴.۹۰۰	۱۱۱۰ (مشروط به عدم استفاده از سوخت ماکمل فسیل (گاز شهری))	دارد	ندارد	ندارد	معادل ۲۳۵.۰۰۰.۰۰۰ میلیون دلار ۳۰۰	۱.۷۵٪	هزینه بالا	۱۸	





# F- معرفی شرکت و خلاصه گزارشات تصویری سیر اقدامات :

برخی از گواهی ها ، مجوزات و مدارک فنی



تلاشها ، تفاهم نامه ها ، تاییدیه ها و پیش نویسهای متعدد با شهرداریهای کشور :



جلسات متعدد بحث و بررسی و مبادله تفاهم نامه با شهرداریهای مختلف کشور ، صندوق ملی محیط زیست و سازمانهای دولتی بانک EIH و برخی مقامات و نمایندگان



جلسات و بازدیدها در کشور آلمان



حضور در جلسه ویژه پسماند در مجلس - ۱۳۹۹



نکات تصمیم ساز و آیت‌های مثبت پروژه پیشنهادی

انتخاب بهره‌ورترین تکنولوژی روز  
دنیا جهت ماکزیمم تولید برق ممکن  
و دوست‌دارترین برای محیط زیست  
و بیشترین میزان امحاء زباله

کاهش هزینه ساخت از ۲۵۰ میلیون  
یورو به ۱۱۰ میلیون یورو با سرمایه  
گذاری خاص تکنولوژی بر روی  
شریک ایرانی

تحقق کمترین اراضی لازم ،  
محصول ثانوی قابل ذخیره با استفاده  
چند منظوره ، حداقل استهلاک  
تجهیزات و امحاء کامل شیرابه

کارسازی وام ۵ ساله بصورت ۲ سال  
توقف و ۳ سال بازپرداخت با نرخ  
۴.۵٪ ( با ۱۵٪ سپرده گذاری )

انتخاب روش مناسب جهت بهره  
مندی از مزایای افزایش ۳۰ درصدی  
بعلاوه مبلغ افزایشی دوم باستناد  
قانون خرید تضمینی برق و تبصره  
های آن در فروش برق

تغییر قالب قرارداد پیشنهادی از  
B.O.T به E.P.C +F  
با توجه به مشکلات پیش رو

اخذ موافقت اولیه برای بخش تهیه  
طرح و مطالعات پایه بلاعوض به  
پروژه از طریق منابع صندوق ملی  
محیط زیست برای شهر تبریز

اخذ موافقت صاحب تکنولوژی برای  
۸۰٪ ساخت داخل و انتقال تکنولوژی  
به میزان ۱۴۰ میلیون یورو سرمایه  
گذاری بلاعوض

انتخاب بهترین و به روزترین تکنولوژی  
دنیا و برترین کشور صنعتی دنیا بعنوان  
طرف دوم با قابلیت تطابق کامل با  
فرهنگ تولید زباله ایران



ضمن تشکر و قدردانی از کلیه حاضرین محترم در جلسه و تشکر ویژه از مسئولین محترم اتاق

بازرگانی ، صنایع ، معادن و کشاورزی ایران ، آذربایجان شرقی – تبریز

به ویژه جناب آقای قویدل

## تبریز شهر اولین ها

ولایق بهترین هاست ، امیدواریم ما نیز با کمک دوستان آلمانی خود

بهترین کار ممکن را برای شهرمان به ارمغان بیاوریم

یازدهم دی ماه ۱۳۹۹ شمسی

