طاقة الشمال

North Lebanon Alternative Power

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نوّر البلد بمعالجة النفايـات

شركة طاقة الشمال

المقدم: زياد ملك- مدير العمليات

Waste - To - Energy

LSA Lebanese Scientific Accociation الجمعية العلمية اللبنانية

AECENAR Association for Economical and Technological Cooperation in the Euro-Asian and North-African Region

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لأول مرة في لبنان وتحديداً من الشمال

أول نموذج مميز لتوليد الطاقة الكهربائية عبر معالجة النفايات عن طريق نظام التفكك الحراري

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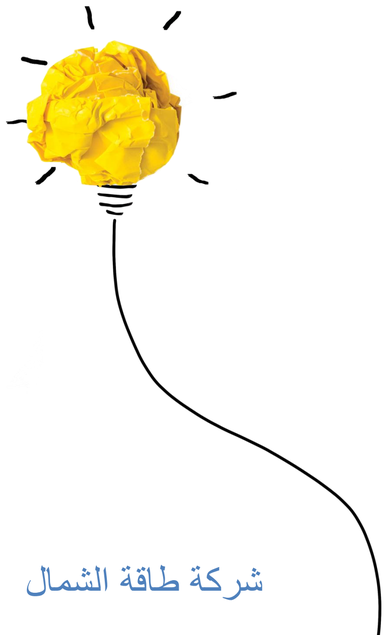
جدول



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المقدمة

بالتزامن مع اشتداد أزمة النفايات المتنقلة بين المناطق اللبنانية والقلق الدائم من استحداث مطامر العوادم التي تشكل عشرين الى ثلاثين في المئة من النفايات،تطرح شركة طاقة الشمال بالتعاون مع عدد من الخبراء والاختصاصيين حلولا علمية لمعالجة النفايات.

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المقدمة

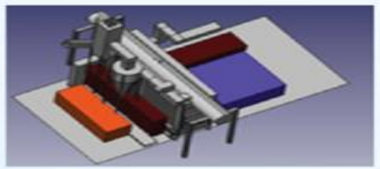
تاريخ الشركة

2005-2013

دراسات هندسية لصناعة محطة طاقة تجاربية محلية

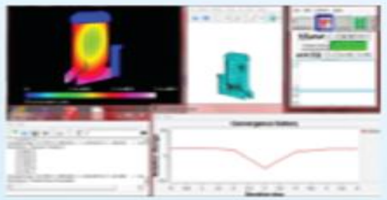
2014

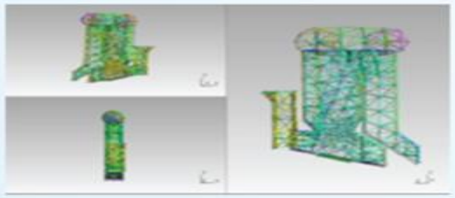
صناعة أول محطة تجاربية ولدت الكهرباء في رأسنحاش



2015

دراسات هندسية لزيادة القدرة الإنتاجية للمحطة وتفعيلها في طرابلس وبعض المدن الأخرى





2016

- انشاء وتشغيل اول نموذج لمحطة متنقلة مستوفية للشروط البيئية المعمول بها في لبنان
- مكتب للمؤسسة في طرابلس

2019 ?!

شركة طاقة الشمال

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من نحن

طاقة الشمال هي شركة منبثقة عن مركز الابحاث AECENAR & LSAالمسجّل في ألمانيا ولبنان . يتعامل هذا المركز مع الجامعات المحلية والخارجيةبحيث تبصر النور المشاريع الطلاّبية وتصبح جاهزة للتسويق ؛وبالتالي نشأ مشروعنا من هذا المركز.

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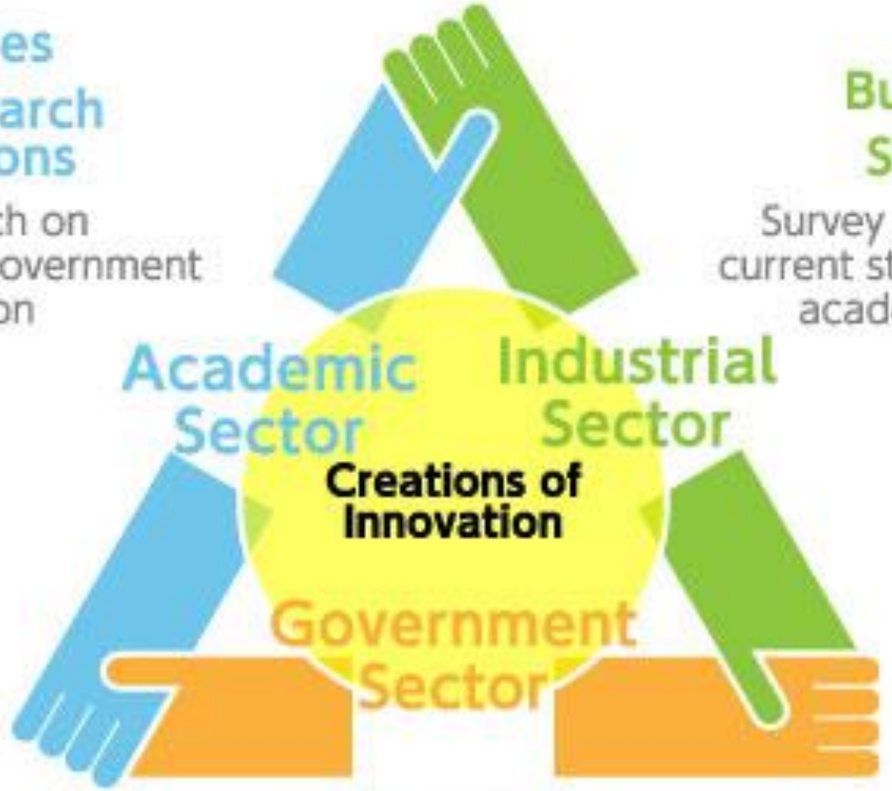
من نحن

Universities
Public Research organizations

Survey research on industry-academia-government collaboration

Businesses
Start-ups

Survey research on the current status and issues of academic start-ups



Government
Local public entities

Survey research on regional innovation activities
- Research on regional innovation systems
- Case study on regional clusters (e.g.food industrial cluster)

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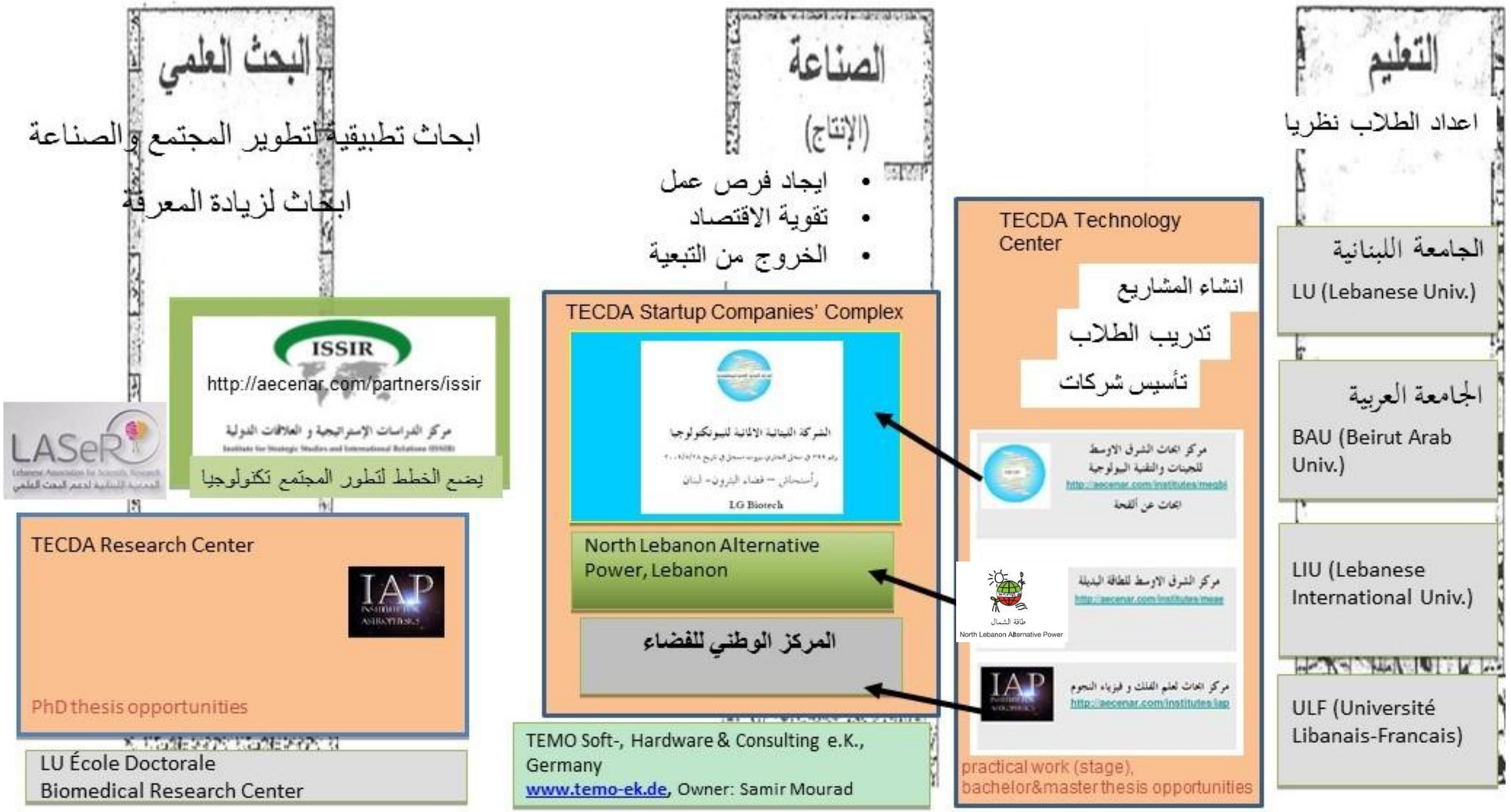

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لماذا نظام تفكك الحراري ؟

تعريف WTE
موقف العالم والدول المتقدمة من Incinerations

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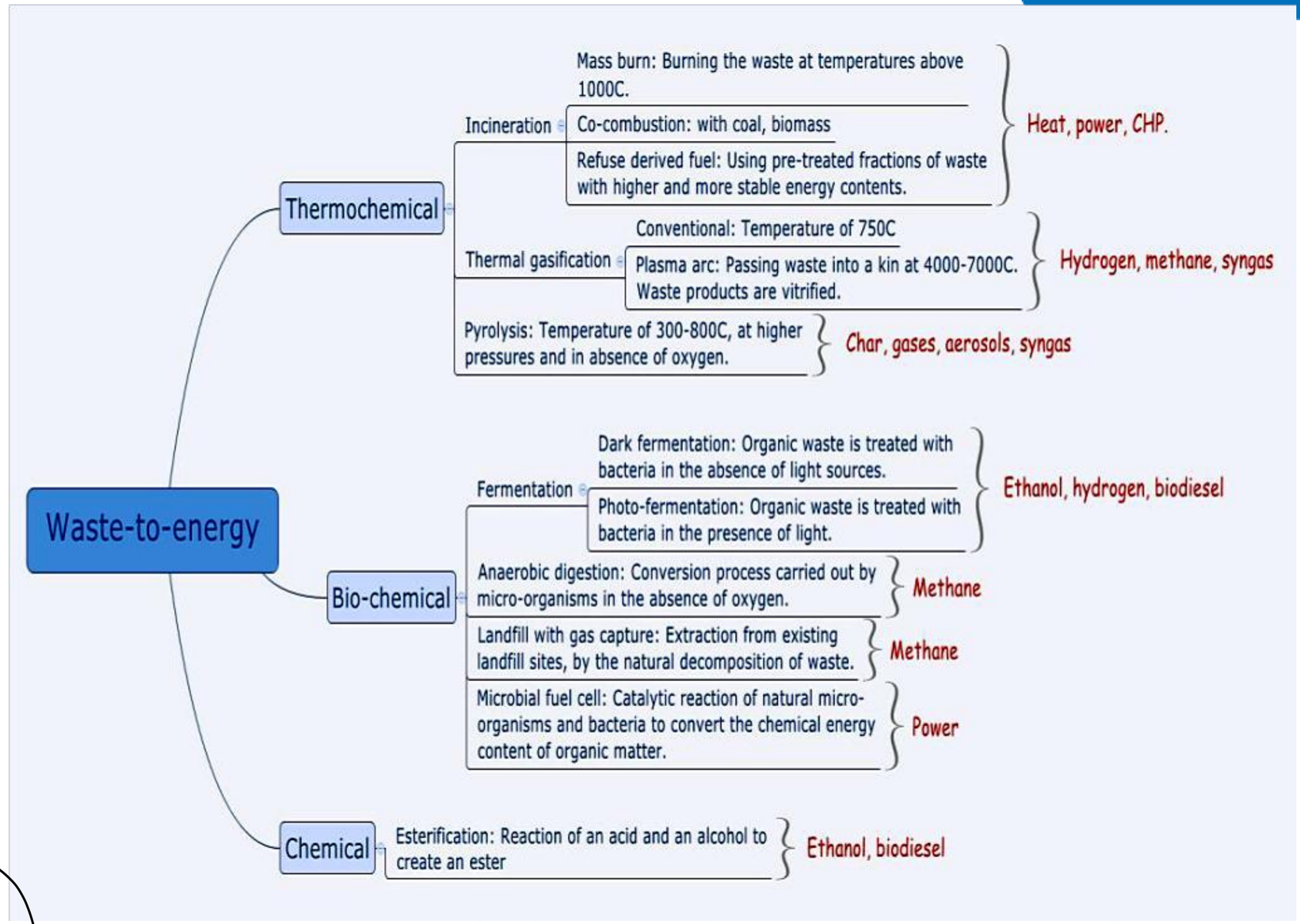
لماذا نظام تفكك الحراري



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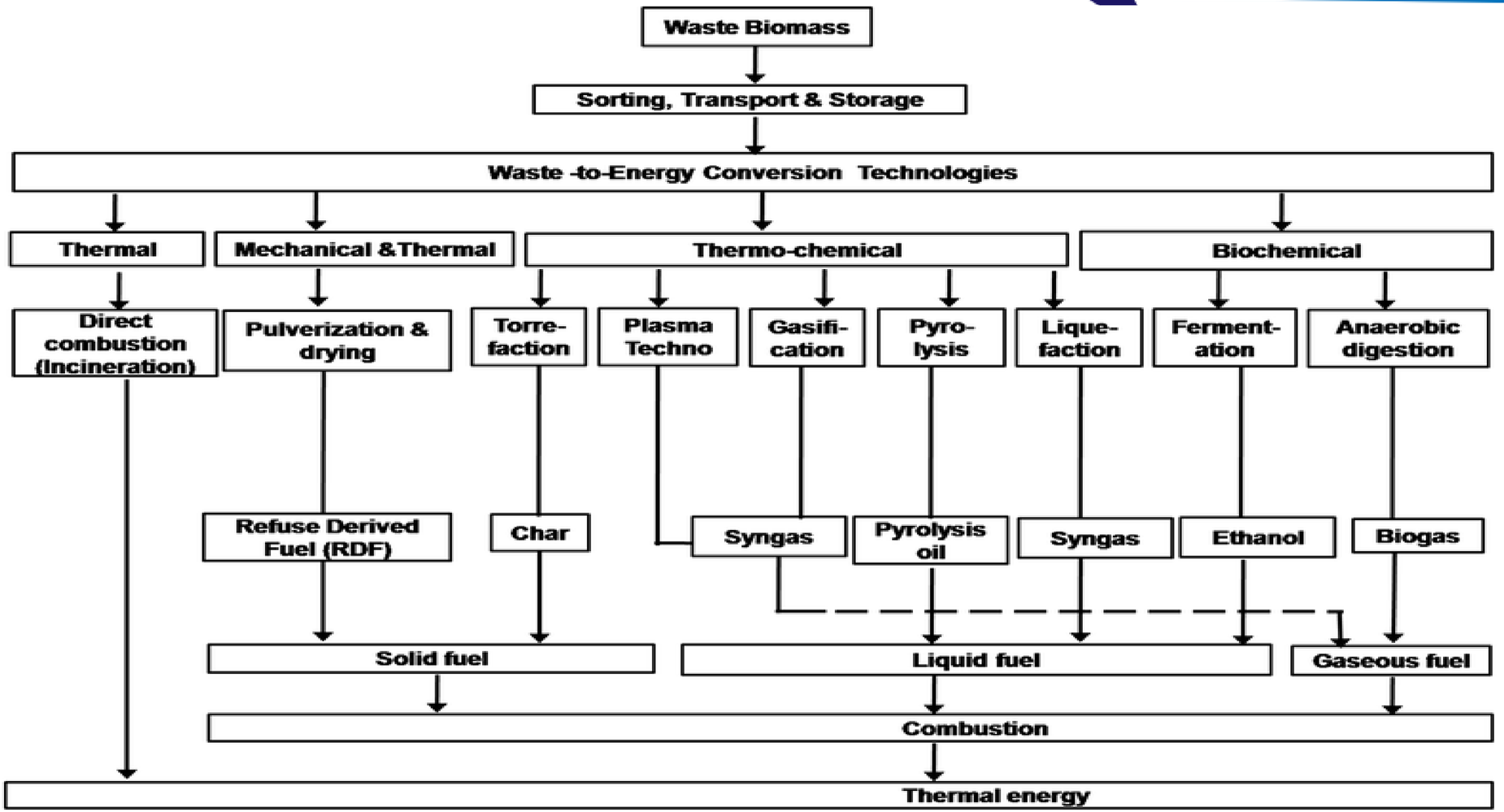

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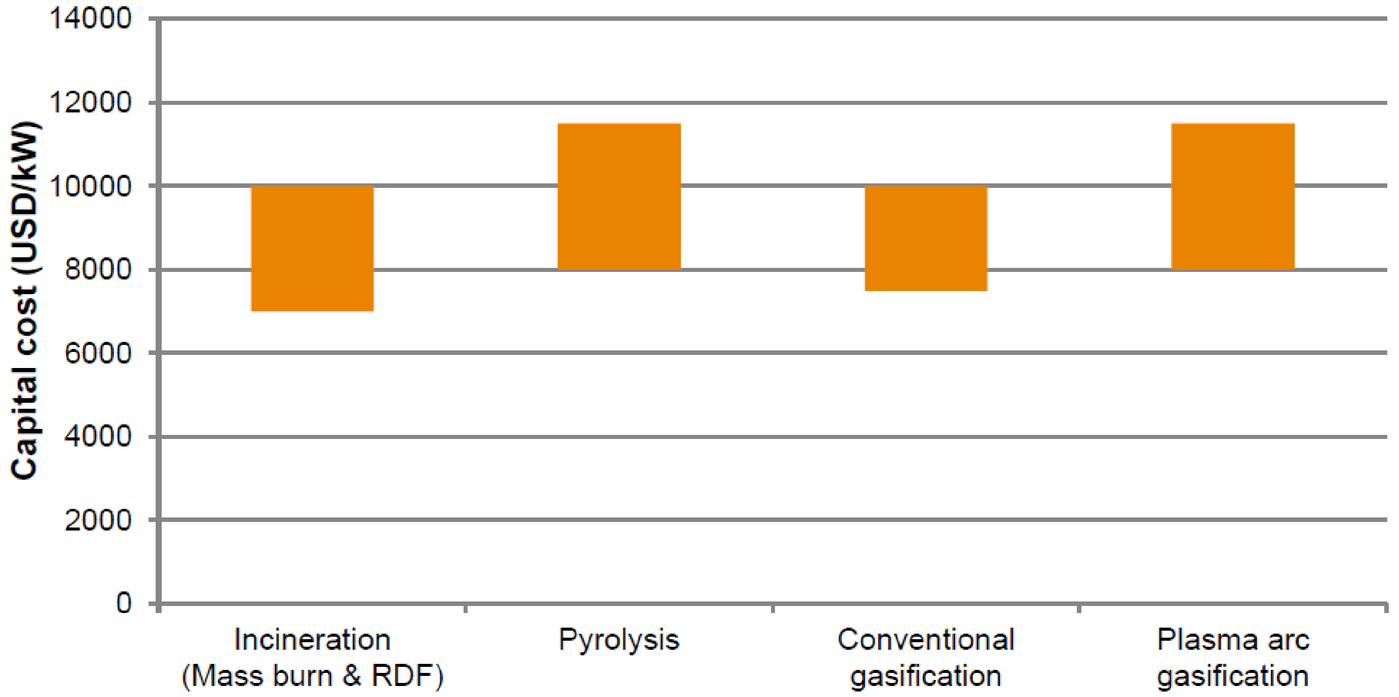
لماذا نظام تفكك الحراري

CAPITAL COSTS FOR THERMAL WTE POWER GENERATION TECHNOLOGIES IN THE UNITED STATES (15 MW OUTPUT)

The capital investments for the construction and implementation of these technologies, and the costs needed to operate them for the entire lifetime of a chosen project can influence decisions.

As of today, incineration of MSW still presents the most desirable economic conditions on the market, and is therefore the preferred option in most markets.

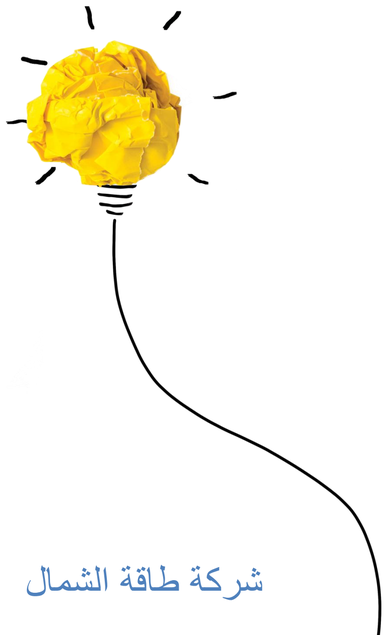


Source: Stringfellow (2014)

BIOMASS AND WASTE POLICY TARGETS IN SELECTED COUNTRIES

Country	Biomass and waste targets
China	30 GW by 2020
Germany	14% of heating by 2020
Indonesia	810 MW by 2025
Norway	14 TWh annual production by 2020
Philippines	267 MW by 2030
United States	Contained in state-level Renewable Portfolio Standards

Source: Navigant Research (2014)



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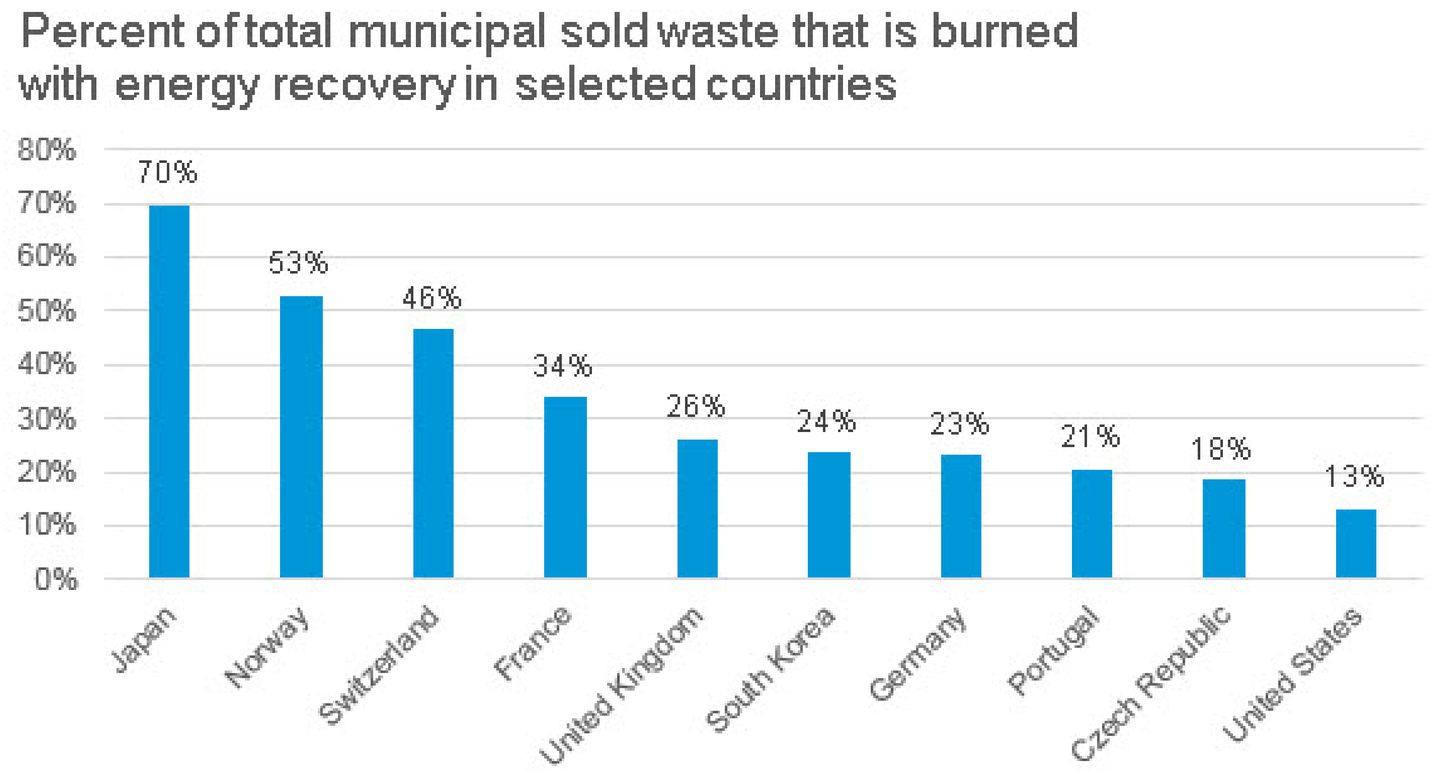
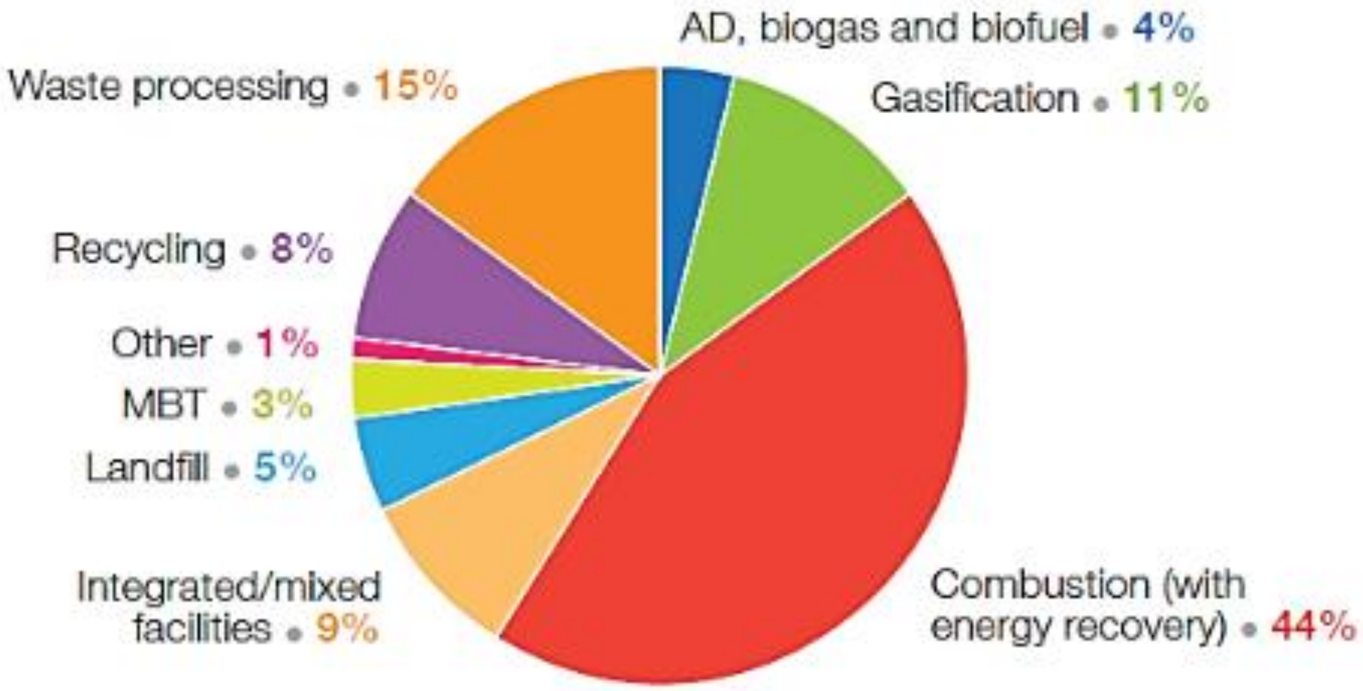


Note: Data for Japan and South Korea are for 2013. Data for other countries are for 2014.
Source: U.S. Environmental Protection Agency for the United States, Organization for Economic Cooperation and Development for other countries

eia

Utility Scale Plants existing according to the technology used.

(Data from 93 countries in 2013-2014 (total of 2723 facilities)).



*(Mechanical

Biological Treatm
-MBT)

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Incinerator in world

لماذا نظام تفكك الحراري

The largest scale plant with the capacity to handle 4,320t/day was built in Singapore in only 38months
Source: Mitsubishi Heavy Industries, Environmental & Chemical Engineering Co., Ltd.

In Thailand, an industrial waste incinerator has been operating from 2006. Its treatment capacity is 100t/day.
Source: JFE Engineering Corporation

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لمحة عامة عن المشروع

تنقية دخان محطات التفكك الحراري
Flue Gas Purification
(Thermal treatment: incineration)

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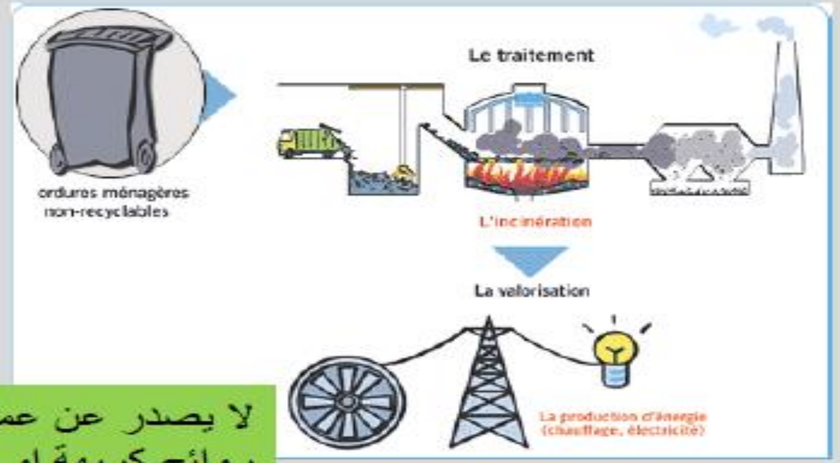
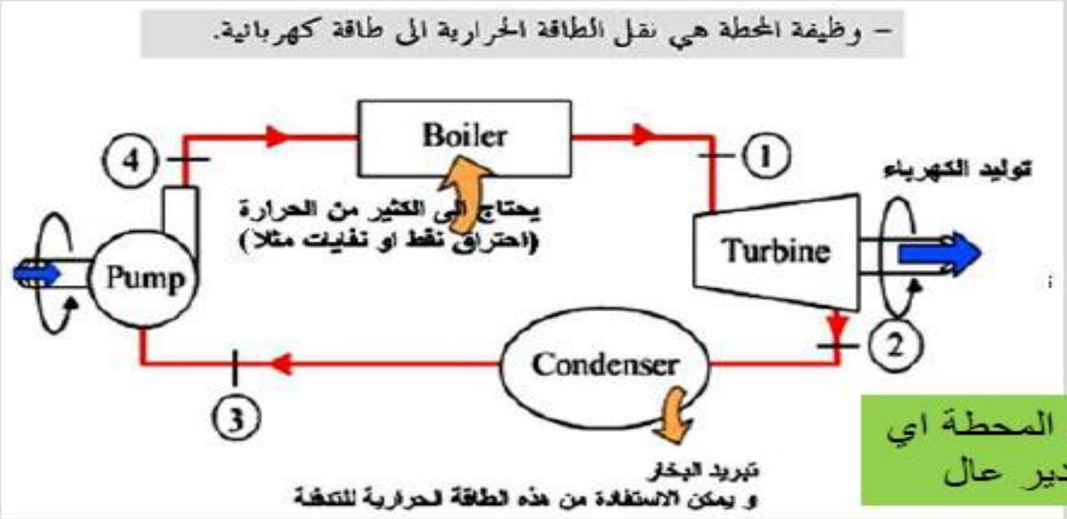
لمحة عامة عن المشروع

1 محطة طاقة تعمل على حرق النفايات



لا يصدر عن عمل المحطة اي روائح كريهة او هدير عال

2 كيف يتم توليد الكهرباء في المحطة؟



3 فرز النفايات في البيت

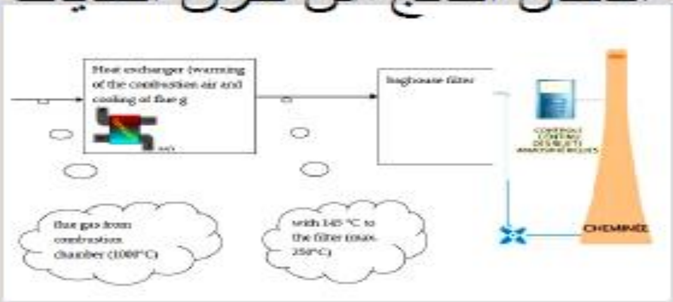
ما لا يحرق في المحطة:

~~بطاريات~~

~~زجاج~~

~~حديد~~

4 تنقية الدخان الناتج عن حرق النفايات



بعد تنقية الدخان المنبعث لا يبقى ما هو سامّ او مضر بالبيئة

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لمحة عامة عن المشروع

Fraction	Net Calorific Value (MJ/kg)
Paper	16
Organic material	4
Plastics	35
Glass	0
Metals	0
Textiles	19
Other materials	11

Source: ISWA (2013)

Residues of incineration of 1 ton of waste
700 kg of gas,
300 kg of solid residues including 30 kg of fly ash.

Division of emissions(depending on their size and the degree of severity:)

Challenges

Non-harmful to the environment لا تضر بالبيئة	harmful to the environment تضر بالبيئة	Toxic gases الغازات السامة
Nitrogen (N_2), Oxygen (O_2), and water vapor (H_2O)	Acid gases: nitrogen dioxide (NO_2), nitrogen oxide (NO), Sulfur dioxide (SO_2), carbon dioxide (CO_2),HCl, Dust	Furans, dioxins, heavy metals (Hg from batteries, cadmium, plumb, zinc)

1. Techniques for the reduction of nitrogen oxide(تقنيات للحد من أكسيد النيتروجين)

-Thermal NOx: When burning a portion of the nitrogen in the air is oxidized to nitrogen oxides. This reaction occurs only significantly at temperatures above 1300 ° C. The reaction rate depends exponentially on the temperature and is directly proportional to the oxygen content
-Fuel NOx: when burning a portion of the nitrogen contained in the fuel is oxidized to nitrogen oxides.

PROCESS OF REDUCING NON-SELECTIVE CATALYTIC (SNCR):
the reducing agent (typically ammonia or urea) is injected into the furnace and reacts with nitrogen oxides. The reactions occur at temperatures between 850 and 1000 ° C, with higher reaction rates and lower in this range. To be effective, the catalyst generally requires a temperature between 180 and 450 ° C. The majority of systems uses waste incinerators currently operating at temperatures of the order of 230-300 ° C.

Selective Catalytic Reduction (SCR) is a catalytic process during which ammonia mixed with air (the reduction agent) is added to the exhaust gas and passes through a catalyst, usually a sieve (e.g. Platinum, rhodium, TiO_2, zeolites). When passing through the catalyst, ammonia reacts with NOx to give nitrogen and water vapor.

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2.Treatment of dioxin and furans and mercury Hg & CO_2(علاج الديوكسين والفيوران)

By activated carbon(can be also called "lignite Coke for odorous compounds.)
Activated carbon is in the form of a fine black talc. Its elementary particles are made porous by a suitable heat treatment so as to create therein pores having dimensions of affinity with the molecules to be filtered. So there are formulations of active carbon adapted to different molecules that one wishes to retain.

The Environmental Protection Agency (EPA) showed that dioxins broke down easily when exposed to temperatures in excess of 1,200 °C.

To obtain a minimum feeding rate (F(min)) of activated carbon (AC), It was found that dioxin removal efficiency(eta) increased with an increase in AC feeding concentration. This had an almost linear function to F/Q when F/Q was less than 65 g/Nm(3), where F was the AC feeding rate (mg/min), and Q was the volumetric flow rate of flue gas (Nm^3/min). However, it did not seem to be affected by F/Q, when F/Q was larger than 150 mg/Nm^3). On the basis of the experimental data obtained in this study, the removal efficiency of dioxins by the application of AC could be correlated as eta (%)=100/[1.0+(40.2/(F/Q)(3))]. It is valid in appropriate conditions (F/Q=10-300 mg/Nm^3)) suggested by the study with a statistical error of +/-18%.

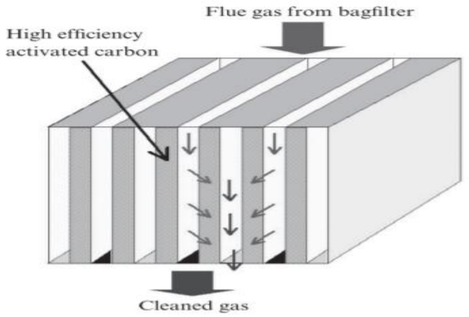
Measurement :The Intelligent Gravimetric Analyzer (IGA)
The system is an ultra-high vacuum (UHV) system and allows measurement of isotherms and accurate determination of the adsorption and desorption kinetic profiles for each pressure step. The system consists of a fully computer controlled microbalance, pressure admit system and temperature regulation system

Dioxins concentrations at activated carbon adsorber

	Dioxins concentrations (ng-TEQ/m^3-norm.)		Removal-efficiency (%)
	Inlet	Outlet	
Electric furnace for steel	5.5	0.009 3	99.83
Ash melting furnace	1.8	0.000 80	99.96
Waste furnace	1.1	0.000 16	99.99

Hg concentrations at activated carbon adsorber

	Inlet (mg/m^3-norm.)	Outlet (mg/m^3-norm.)
Waste furnace	0.065	<0.005 (Under determination limit)
Ash melting furnace	0.57	<0.005 (Under determination limi



Cartridge packed with activated carbon

Ref:Minimum feeding rate of activated carbon to control dioxin emissions from a large-scale municipal solid waste incinerator, Article in Journal of Hazardous Materials 161(2-3):1436-43 · June 2008 with 289 Reads DOI: 10.1016/j.jhazmat.2008.04.128 · Source: PubMed

3.Acid gas treatment technologies(HF, HCl and SO_2)تقنيات معالجة الغاز الحمضي

Depending on the concentrations, temperature, size of the flow to be treated and of further parameters, can be used different technologies for the treatment of acid gas emissions. Being a quick summary we can mention:

Bag filters with reagent injection(calcium hydroxide ($Ca(OH)_2$) or sodium bicarbonate))

The filters in flat bags are successfully used for the chemical absorption of acid gases such as HF, HCl and SO_2 in addition to the adsorption of other pollutant compounds. Generally it is used, among others, calcium hydroxide and sodium bicarbonate ($Ca(OH)_2$) of typical commercial quality, which is injected in the gas stream before entering the filter. To achieve proper compliance with the emission limits required, the additive should be added in amounts over-stoichiometric (from 1.5 to 3 times).
at least 130-200 ° C

- Treatment by $Ca(OH)_2$:

$$Ca(OH)_2 + 2HCl \leftrightarrows CaCl_2 + 2H_2O$$

$$Ca(OH)_2 + 2HF \leftrightarrows CaF_2 + 2H_2O$$

$$Ca(OH)_2 + SO_2 \leftrightarrows CaSO_3 + H_2O$$

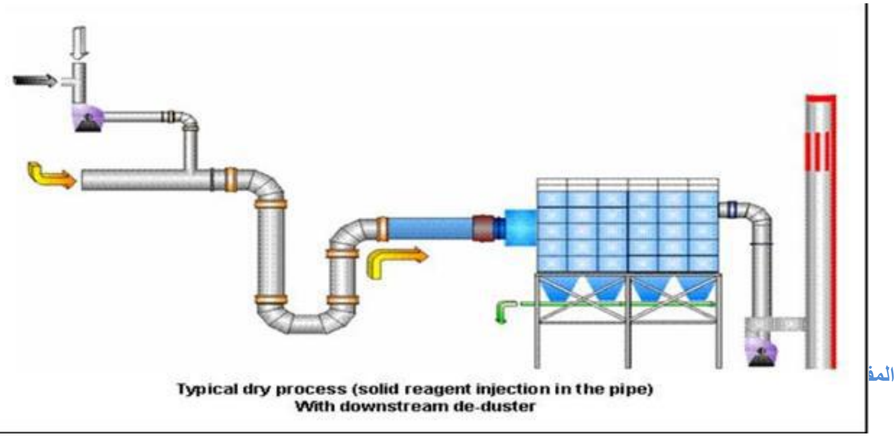
$$CaSO_3 + 1/2\ O_2 \rightarrow CaSO_4$$

- Treatment by $NaHCO_3$:

$$NaHCO_3 + HCl \leftrightarrows NaCl + CO_2 + H_2O$$

$$NaHCO_3 + HF \leftrightarrows NaF + CO_2 + H_2O$$

$$2NaHCO_3 + SO_2 + 1/2O_2 \rightarrow Na_2SO_4 + 2CO_2 + H_2O$$

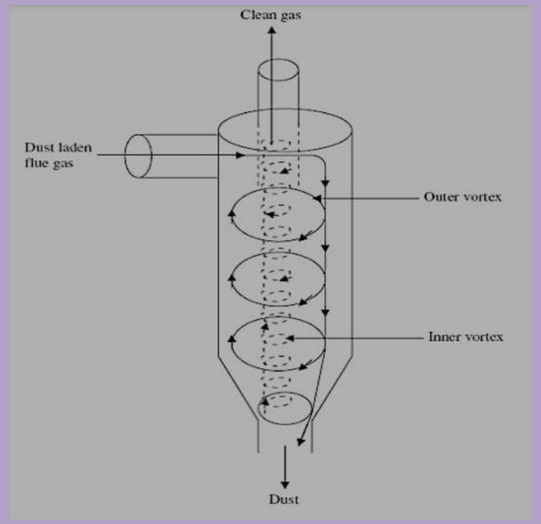


Typical dry process (solid reagent injection in the pipe)
With downstream de-duster

4.Treatment of dust (علاج الغبار)

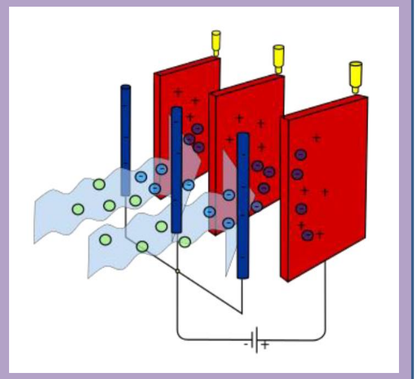
Particles between 5 & 50 micron and volatized heavy metals

Mechanical treatment :
العلاج الميكانيكي
Cyclone(efficiency:91%)



Less than 5 micron

Electrical treatment :
العلاج الكهربائي
The electrostatic precipitator (ESP)(efficiency:95%)

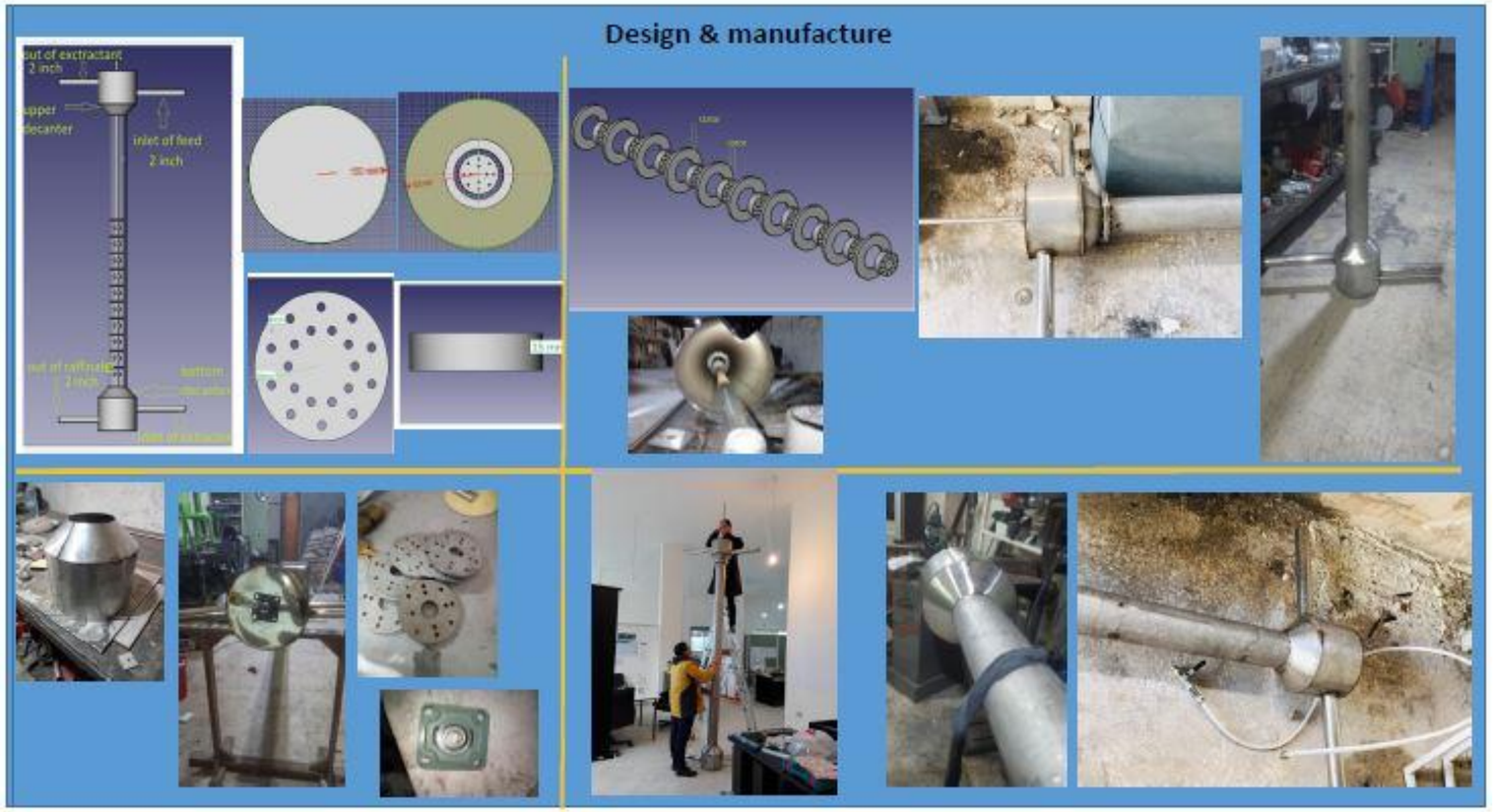


Bottom & flying ashes: heavy metals recovery

Heavy Metals Recycling Unit for NLAP-IPP Demonstration Plant

Lists of metals (mg/kg)

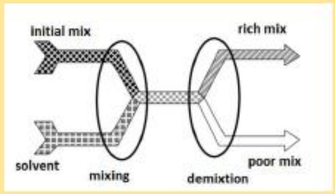
Element bottom ash	Bottom ash	Fly ash	Dry / quasi-dry	wet
Al	22.000-73.000	49.000 - 90.000	12.000-83.000	21.000-39.000
Cd	0.3-70	50-450	140-300	150-1.400
Cu	190-8.200	600-3.200	16-1.700	440-2.400
Fe	4.100-1500	12.000 - 44.000	2.600-71.000	20.000-97.000
Hg	0,02-8	0,7-30	0,1-51	2,2-2.300
Mo	2-280	15-150	9-29	2-44
Pb	100-13.700	5.300-26.000	2.500-10.000	3.300-22.000
Zn	61-7.800	7.000-70.000	7.000-20.000	8.100-53.000



Bottom & flying ashes: heavy metals recovery

Process

Solvent extraction, or liquid-liquid extraction is a separation technique isothermal in a heterogeneous liquid medium.
The method is based on the existence of a difference in the solubility of a substance in two immiscible liquids. The process has three steps, as shown in next figure :
- Mixture of the two immiscible liquids, one of them containing the solute,
- Obtaining physico -chemical equilibrium, leading to demixing ,
Separation of the two new liquid phases obtained based on the difference of



EXTRACTANTS

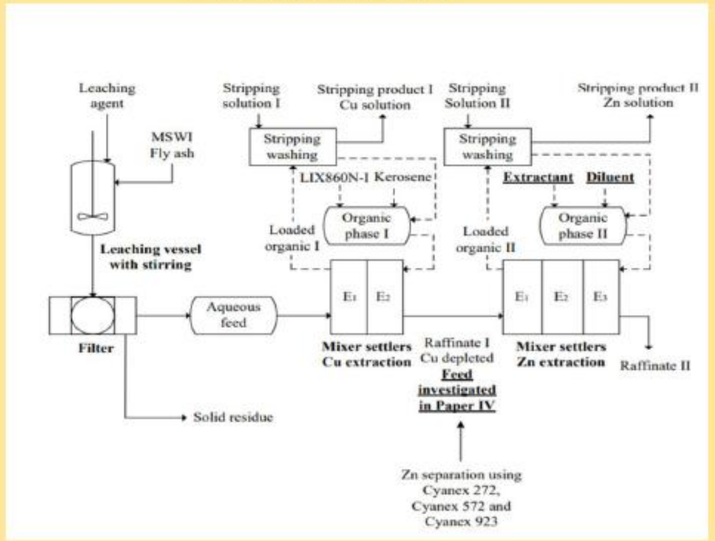
Oxime based extractants for copper are largely based on salicyaldoximes which have been modified with one of three modifier types. Examples of the three main extractant types currently in use are:

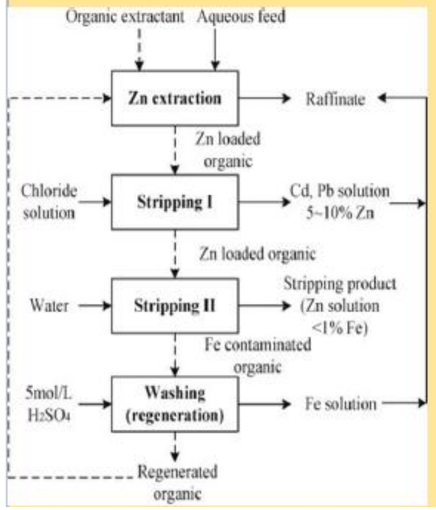
1. LIX® 984N
A mixture of 2-hydroxy-5-nonylacetophenone oxime and 5-nonylsalicylaldoxime in a high flash diluent. The acetophenone oxime modifies the aldoxime and also performs as an extractant in its own right. Molecular Weight:262.393 g/mol.

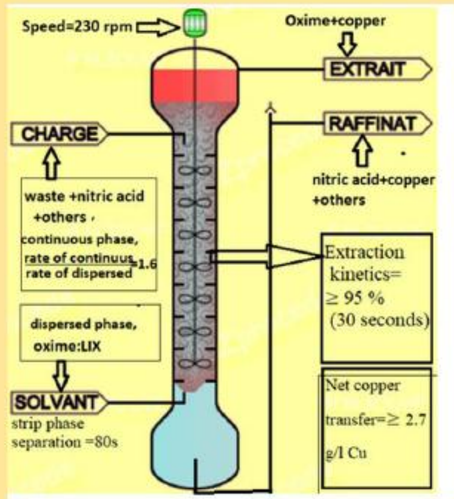
2. Acorga® M5640
5-Nonylsalicylaldoxime modified with an ester, 2,2,4-Trimethyl-1,3-pentanediol Diisobutyrate (TXIB) in a high flash diluent.

3. LIX® 622N
5-Nonylsalicylaldoxime modified with tridecyl alcohol in a high flash diluent.
Each of the extractants marketed by the major chemical suppliers has been designed for a specific type of PLS with regard to pH and copper tenor. Used

Steps of extraction







نظام التحكم في العمليات
Processing Control Unit (PCU)

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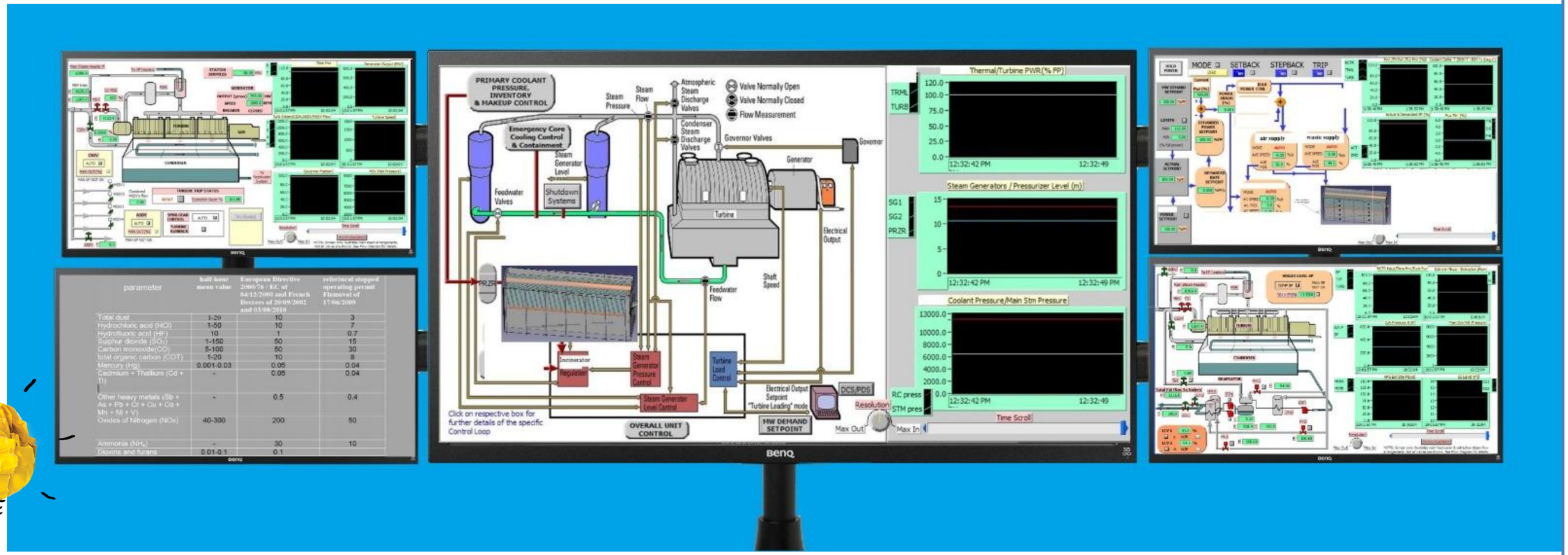
نظام التحكم في العمليات



parameter	half-hour mean value	European Directive 2000/76 / EC of 04/12/2000 and French Decrees of 20/09/2002 and 03/08/2010	reference stepped operating permit Flamoval of 17/06/2009
Total dust	1-20	10	3
Hydrochloric acid (HCl)	1-50	10	7
Hydrofluoric acid (HF)	10	1	0.7
Sulphur dioxide (SO_2)	1-150	50	15
Carbon monoxide(CO)	5-100	50	30
total organic carbon (COT)	1-20	10	8
Mercury (Hg)	0.001-0.03	0.05	0.04
Cadmium + Thallium (Cd + Tl)	-	0.05	0.04
Other heavy metals (Sb + As + Pb + Cr + Cu + Co + Mn + Ni + V)	-	0.5	0.4
Oxides of Nitrogen (NOx)	40-300	200	50
Ammonia (NH_3)	-	30	10
Dioxins and furans	0.01-0.1	0.1	

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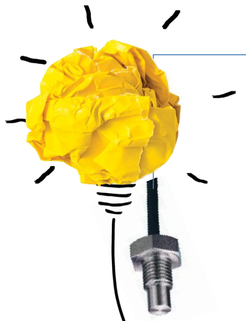
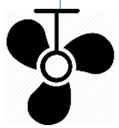
نظام التحكم في العمليات

- Monitoring
- (+control)

Modbus RTU

Control Unit (PLCs)





Sensors/ actuators

incinerator control

Boiler pressure control

turbine generator control

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لمحة عامة عن المشروع

نظام مراقبة تلوث الهواء على الانترنت
Air Pollution Monitoring Online System

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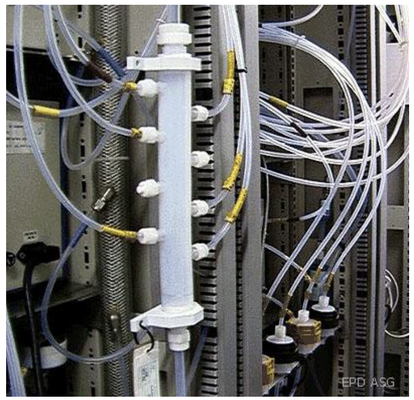
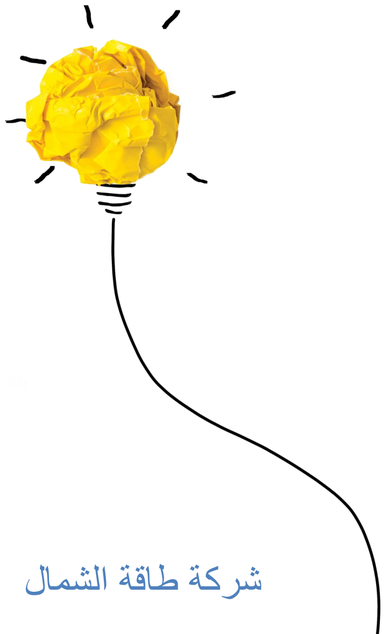
ظام مراقبة تلوث الهواء على الانترنت





شركة طاقة الشمال

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معايير السلامة و البيئة

معايير السلامة و البيئة

parameter	half-hour mean value	European Directive 2000/76 / EC of 04/12/2000 and French Decrees of 20/09/2002 and 03/08/2010	refectural stopped operating permit Flamoval of 17/06/2009
Total dust	1-20	10	3
Hydrochloric acid (HCl)	1-50	10	7
Hydrofluoric acid (HF)	10	1	0.7
Sulphur dioxide (SO_2)	1-150	50	15
Carbon monoxide(CO)	5-100	50	30
total organic carbon (COT)	1-20	10	8
Mercury (Hg)	0.001-0.03	0.05	0.04
Cadmium + Thallium (Cd + Tl)	-	0.05	0.04
Other heavy metals (Sb + As + Pb + Cr + Cu + Co + Mn + Ni + V)	-	0.5	0.4
Oxides of Nitrogen (NOx)	40-300	200	50
Ammonia (NH_3)	-	30	10
Dioxins and furans	0.01-0.1	0.1	-

Emission limit values in mg / Nm 3 to 11% O_2 dry gas According to EC 20/09/2010 to an incinerator >6 ton/h

Elements (polluants)	<1 ton/h Maximum value(mg/m^3)	1-3 ton/h Maximum value(mg/m^3)	>3 ton/h Maximum value(mg/m^3)
Dust	200	100	30
Pb+Cr+Cu+Mn	-	5	5
Ni+As	-	1	1
Cd+Hg	-	0.2	0.2
Cl (HCl)	250	100	50
F (HF)	-	4	2
SO_2	-	300	300

Emission limit values in mg /m^3 to respected (Lebanese environmental ministry

معايير السلامة و البيئة

Pressure equipment shall be designed, manufactured, tested and, if necessary, equipped and installed in such a way as to ensure its safety .

Water tube boiler EN 12952-1 to 17
Shell boiler EN 12953-1 to 14

General

Pressure equipment shall be designed, manufactured, tested and, if necessary, equipped and installed in such a way as to ensure its safety when put into service in accordance with the manufacturer's instructions or under reasonably foreseeable conditions.
[Guideline E-03 | Guideline H-07 | Guideline H-15]

تصمم معدات الضغط وتصنع وتختبر ، وإذا لزم الأمر ، مجهزة ومركبة بطريقة تضمن سلامتها عند وضعها في الخدمة وفقاً لتعليمات الشركة الصانعة أو في ظروف معقولة بشكل معقول.

Special Quantitative Requirements for Specific Pressure Equipment {Guideline H-06المتطلبات الكمية الخاصة لمعدات الضغط المحدد

Symbols

Re, t (elastic limit) refers to the following values at the calculation temperature, depending on the case:
- Upper yield strength for materials having a lower and upper yield strength;
- 1.0% proof strength for austenitic and unalloyed aluminum;
- 0.2% proof strength in the remaining cases.
-Rm, 20 denotes the minimum value of tensile strength at 20 ° C.
-Rm, t denotes the tensile strength at the calculation temperature.

The permissible general membrane stress shall

Not exceed the lower of the following values for predominantly static loads and at temperatures outside the range in which creep phenomena are significant, depending on the material used:
Ferritic steel, including normally annealed (normalized rolled) steel, with the exception of fine grain steel and special heat treated steel: 2/3 of Re, t and 5/12 of Rm, 20;
Austenitic steel:
-If the elongation at break is greater than 30%: 2/3 of Re, t;
Or alternatively, if the elongation at break is above 35%: 5/6 of Re, t and 1/3 of Rm, t;
-Unalloyed and low alloy cast steel: 10/19 of Re, t and 1/3 of Rm, 20;
-Aluminum: 2/3 of Re, t;
-Non-hardenable aluminum alloys: 2/3 of Re, t and 5/12 of Rm, 20.
[Guideline G-14]

Connection

Coefficients For welded connections , the connection coefficients must not exceed the following values

For pressure equipment that undergoes destructive and nondestructive tests to verify that the joints are free from significant defects: 1,0 ;

For pressure equipment undergoing non-destructive random sampling: 0,85 ;
For pressure equipment which does not undergo non-destructive testing except for visual inspection: 0,7 .

If necessary, the type of stress and the mechanical and technological properties of the connection must also be taken into account

Load:

In general, a method of calculation according to 2.2.3, supplemented if necessary by an experimental design method .

Pressure equipment shall be designed for loads appropriate to its intended use and other reasonably foreseeable operating conditions. In particular, the following factors should be considered:

Internal and external pressure; الضغط الداخلي والخارجي: EN 12952-3
ambient and operating temperatures;

درجات الحرارة المحيطة والتشغيلية

Static pressure and filling weights under operating and test conditions;

ضغط ثابت وملء الأوزان تحت ظروف التشغيل والاختبار

Reaction forces and moments related to supporting elements, fixings, piping, etc .; قوات رد الفعل واللحظات المتعلقة بدعم العناصر ، المثبتات ، الأنابيب ، وما إلى ذلك
corrosion and erosion, material fatigue, etc .;

Decomposition of unstable fluids.
تحلل السوائل غير المستقرة

Pressure

Limiting devices , in particular for pressure vessels The temporary pressure exceeding specified in section 2.11.2 shall be limited to 10% of the maximum permissible pressure

Material

Properties Unless other criteria to be considered require other values, a steel shall be considered to be sufficiently ductile within the meaning of 4.1 (a) if its elongation at break is at least 14% in the standard tensile test and the notch impact work on an ISO-V sample at a temperature of not exceeding 20 ° C, but not exceeding 27 J at the intended lowest operating temperature.
[Guideline G-13 | Guideline G-17 | Guideline G-18 | Guideline G-22 | Guideline G-28]

Hydrostatic test pressure

For pressure vessels, the hydrostatic test pressure specified in section 3.2.2 shall be the higher of the following:
- 1.25 times the maximum load of the pressure equipment in service, taking into account the maximum permissible pressure and the maximum permissible temperature, or
-The 1.43-fold value of the maximum allowable pressure
[Guideline C-06 | Guideline H-02 | Guideline H-16]

Design to the required load capacity: EN 12952-3

Appropriate design calculations shall be carried out to demonstrate the load capacity of the pressure equipment concerned.
In particular, the following applies:
The calculation pressures must not be lower than the maximum allowable pressures, and the static and dynamic fluid pressures as well as the decay pressures of unstable fluids must be taken into account.
The calculation temperatures must have reasonable safety margins.
The maximum stress and stress concentrations must be within safe limits.
–Yield strength, 0.2% or 1% proof strength at the calculation temperature
The operating instructions referred to in section 3.4 must indicate design features that are relevant to the life of the device, for example:
For creep : design life in hours at specified temperatures;
For fatigue : design cycle number at specified voltage values;
-For corrosion : corrosion surcharge during design.

The test program must include:

a) A compressive strength test designed to verify that, in the event of pressure with a margin of safety above the maximum allowable pressure, the instrument will not show significant leakage or deformation beyond a specified limit.

For the determination of the test pressure, the differences between the values measured under test conditions for the geometrical characteristics and the material properties on the one hand and the values permitted for the construction on the other hand shall be taken into account; the difference between test and design temperatures must also be considered.
EN 12952-3 : 12.1.2.1.2.3.3;

Precautions for Safety in Handling and Operation

The pressure equipment controls shall be such that their operation does not give rise to a reasonably foreseeable hazard. If applicable, the following points should be noted:
-Closing and opening devices;
-Dangerous blow-off from pressure relief valves;
- Devices to prevent physical access in case of overpressure or vacuum in the device;
- Surface temperatures taking into account the intended use;
- Decomposition of unstable fluids.
EN 12952-12 : 5 for tube B
EN 12953-7 for shell B
- EN 12953-10 : 4.5;

Precautions for Inspection

a) Pressure equipment shall be designed so that all required safety inspections can be carried out.
b)) Other means to ensure a safe condition of the pressure equipment can be used
c) EN 12952-3 : 5.6.1 for tube B
d) EN 12953-3 : 14 for shell B

Draining and venting facilities

If necessary, suitable devices for draining and venting the pressure equipment must be provided:
EN 12953-3 : Tube Boiler
EN 764-7 : 8.1.4.8.1.5; 8.2.3; 8.5.6; shell Boiler
To avoid harmful effects such as water hammer, vacuum collapse, corrosion and uncontrolled chemical reactions; all operating and test conditions, in particular pressure tests, must be taken into accountEN 12952-3 : 9.4.3;

Production materials

The materials used in the manufacture of pressure equipment, unless they are to be replaced, must be suitable for the entire intended service life.
Welding consumables and other joining materials need only comply with the relevant requirements of sections 4.1, 4.2 (a) and 4.3 first paragraph, both individually and in combination.
EN 12952-3 : 3.1; 3.4

They must be sufficiently chemically resistant to the fluids carried in the pressure equipment; the chemical and physical properties required for operational safety must not be significantly impaired during the intended service life;
c) they must not be significantly impaired by aging;

Fired or otherwise heated overheating-prone pressure equipment in accordance with Annex I

-a) Appropriate safeguards are provided to limit operating parameters such as heat input, heat output and, where applicable, fluid level to avoid the risk of local or general overheating
(b) where necessary, provide sampling points so that the properties of the fluids can be assessed to avoid risks associated with deposits and / or corrosion;
-(c) Reasonable precautions are taken to eliminate the risks of deposit damage;
d) Possibilities for the safe removal of residual heat after a shutdown are created;
-e) measures are taken to prevent the dangerous accumulation of flammable mixtures of flammable substances and air and flashback

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تقييم الأثر البيئي لمحطة طاقة كهربائية تعمل على التفكك الحراري للنفايات في سرار– عكار

Environment Impact Assessment (EIA) for an 15 MW waste incineration power plant in Srar/Akkar, Noth Lebanon

معايير السلامة و البيئة

What is EIA?

- To identify and evaluate the predictable environmental consequences of the proposed project
- the best combination of economic and environmental costs and benefits of the proposed project
- تحديد وتقييم العواقب البيئية المتوقعة للمشروع
- أفضل مزيج من التكاليف والفوائد الاقتصادية والبيئية للمشروع المقترح

WHO does EIA? من يقوم بالتقييم الاثر البيئي؟
The project proponent صاحب المشروع بإستعانة خبراء

How is EIA done?

- **Identification of the consequences of the project proposal.**
- **Prediction of the extent of consequences.**
- **Evaluation of the predicted consequences (Significant or not)**
- **Mitigation of the adverse consequences.**
- **Documentation to inform decision makers what needs to be done.**

- تحديد نتائج الاقتراح.
- التنبؤ بمدى العواقب.
- تقييم النتائج المتوقعة. (كبير أم لا)
- التخفيف من العواقب السلبية.
- وثائق لإعلام صانعي القرار ما يجب القيام به.

Screening
تحري

The Competent Authority makes a decision about whether an EIA is required. At the end, a Screening Decision must be issued and made public.

تقوم السلطة المختصة باتخاذ قرار حول ما إذا كان تقييم التأثير البيئي مطلوبًا أم لا. في النهاية ، يجب إصدار قرار الفحص وإعلانه

Scoping
فحص

The Directive provides that Developers may request a Scoping Opinion from the Competent Authority which:
- Identifies the content and the extent of the assessment
- Specifies the information to be included in the EIA Report.

- ينص التوجيه على أن المطورين قد يطلبون
- استطلاع رأي من الجهة المختصة:
- يحدد محتوى ومدى التقييم

يحدد المعلومات التي سيتم تضمينها في تقرير تقييم التأثير البيئي.

APPENDIX D
ENVIRONMENTAL INFORMATION REQUIREMENTS SET OUT IN ANNEX IV OF DIRECTIVE 97/11/EC

Article 5(1) of Directive 97/11/EC requires the Developer to provide to the Competent Authority the information set out below in so much as the information is relevant to the given stage of the consent process and to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected, and the developer may reasonably be required to compile the information having regard inter alia to current knowledge and methods of assessment.

Environmental Information Requirements for EIA

1. Description of the project, including in particular
a description of the physical characteristics of the whole project and the land-use requirements during the construction and operational phases,
a description of the main characteristics of the production processes, for instance, nature and quantity of the materials used,
a description of the expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc.) resulting from the operation of the proposed project.
2. An outline of the main alternatives studied by the developer and an indication of the main reasons for this choice, taking into account the environmental effects.
3. A description of the aspects of the environment likely to be significantly affected by the proposed project, including in particular: population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the inter-relationship between the above factors.
4. A description of the likely significant effects of the proposed project on the environment resulting from:
the existence of the project,
the use of natural resources,
the emission of pollutants, the creation of nuisances and the elimination of waste,
and a description by the developer of the forecasting methods used to assess the effects on the environment.
5. A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.
6. A non-technical summary of the information provided under the above headings.
7. An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the developer in compiling the required information.

Incineration of Waste Directive 2000/76/EC

The aim of the WI Directive is to prevent or to reduce as far as possible negative effects on the environment caused by the incineration and co-incineration of waste. In particular, it should reduce pollution caused by emissions into the air, soil, surface water and groundwater, and thus lessen the risks which these pose to human health.
This is to be achieved through the application of operational conditions, technical requirements, and emission limit values for incineration and co-incineration plants within the EU.
The WI Directive sets emission limit values and monitoring requirements for pollutants to air such as dust, nitrogen oxides (NO_x), Sulphur dioxide (SO_2), hydrogen chloride (HCl), hydrogen fluoride (HF), heavy metals and dioxins and furans. The Directive also sets controls on releases to water resulting from the treatment of the waste gases. Most types of waste incineration plants fall within the scope of the WI Directive, with some exceptions, such as those treating only biomass (e.g. vegetable waste from agriculture and forestry). Experimental plants with a limited capacity used for research and development of improved incineration processes are also excluded.

EIA Report

1-information regarding the project, 2- the Baseline, 3 - scenario, 4- the likely significant effect of the project, 5 - The proposed Alternatives, 6 - The features and Measures to mitigate adverse significant effects as well as a Non-Technical Summary.

١ – معلومات بخصوص المشروع ، ٢ – خط الأساس ، ٣ سيناريو
٤ – التأثير الهام المحتمل للمشروع ، ٥ – البدائل المقترحة ،
٦ – السمات والإجراءات للتخفيف من الآثار الهامة الضارة بالإضافة إلى الملخص غير الفني.

Decision Making and Development Consent
صنع القرار و
الموافقة على التطوير

1-Examination of the EIA report by the Competent Auth
2-consultation
3-Conclusion on whether the project entails significant effects.

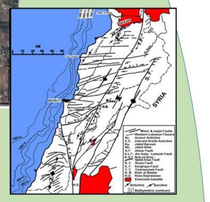
١ - فحص تقرير تقييم التأثير البيئي من قبل السلطة المختصة.
٢ – الاستشارة
٣ - الاستنتاج حول ما إذا كان المشروع ينطوي على تأثيرات كبيرة.

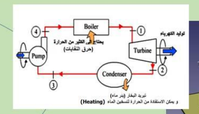
Information on Development Consent and Monitoring
معلومات عن
الموافقة على التطوير والرصد

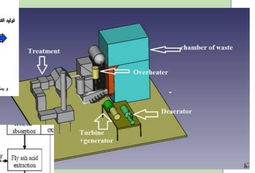
1- Informing the public .
2-During construction and operation the Developer must **monitor the significant adverse effects to mitigate them.**

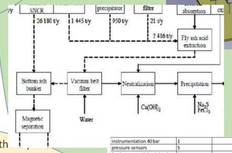
١ – إعلام الجمهور.
٢ –أثناء البناء والتشغيل يجب على المطور مراقبة الآثار الضارة الهامة للتخفيف منها.

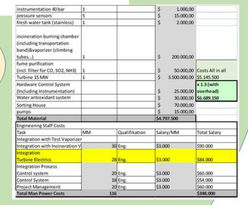
EIA Report for project proposal: 15 MW incineration power plant in Srar/Akkar, Lebanon











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طرق العمل

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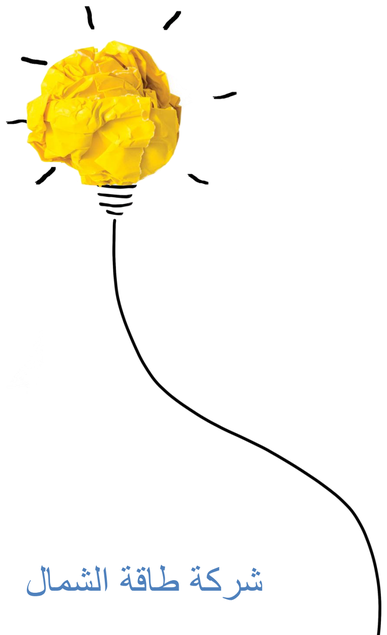
طرق العمل

1.شراء المحطة

(Build – Operate – Transfer) BOT.2

Managed Services.3



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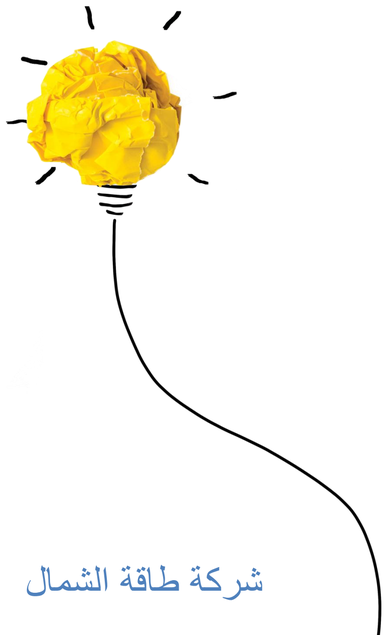
جدوى الاقتصادية

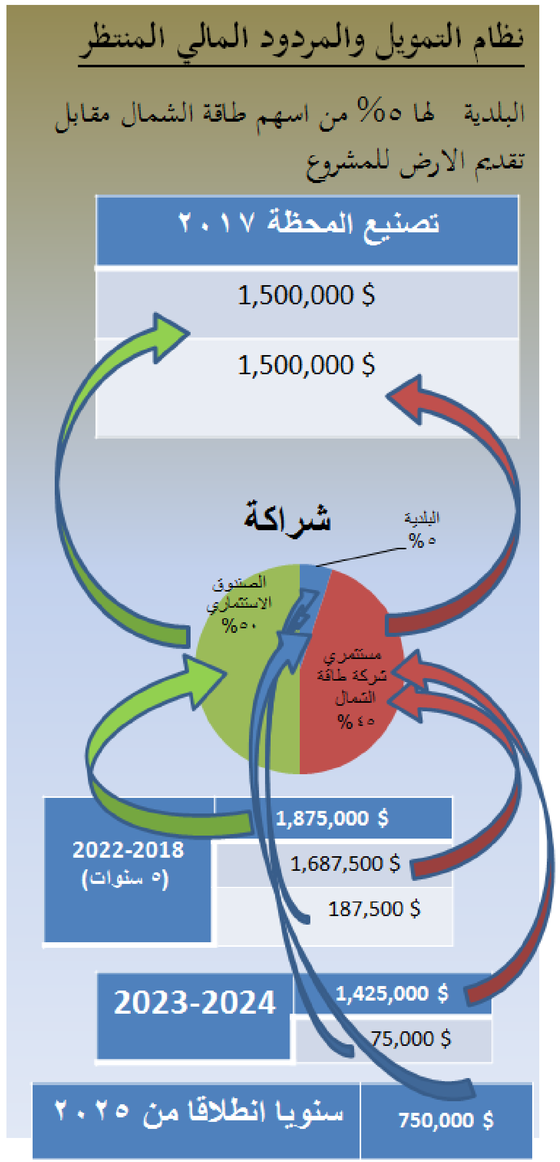
شراء المحطة

~ 3.3 M$Cost+10%

5% Annual Maintenance Contract



جدوى الاقتصادية



(Build – Operate – Transfer) BOT

10 years financial plan

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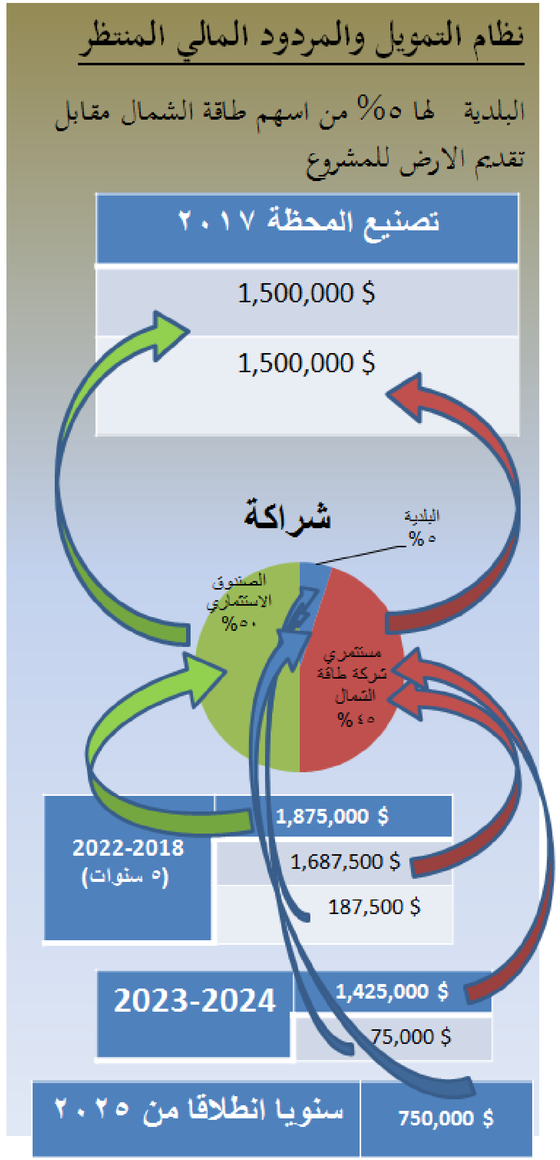
جدوى الاقتصادية



(Build – Operate – Transfer) BOT

10 years financial plan

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القيمة المضافة

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القيمة المضافة

1.تامين فرص عمل (5000)

2.صناعة محلية لكامل المصنع تكون اوفر (Excl Turbines)

3.معالجة لمشكلة النفايات المزمنة في الحال (جبل النفايات – النفايات اليومية)

4.تقليل العجز في الكهرباء

5.الإستفادة من بقايا الحرق لصيانة وتعبيدالشوارع.

6.اعادة تدوير المعادن

Local OMC.7

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مناقشة

طاقة الشمال
North Lebanon Alternative Power

وشكراً

LSA Lebanese Scientific Association الجمعية العلمية اللبنانية

AECENAR
Association for Economical and Technological Cooperation in the Euro-Asian and North-African Region

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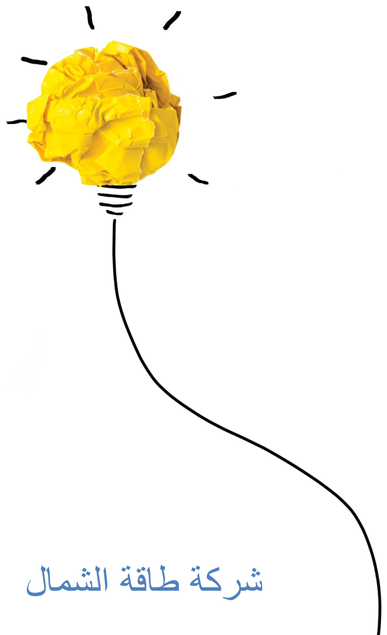
جدوى الاقتصادية

1. نظام التحكم في العمليات



شركة طاقة الشمال