Municipality of **MEJDLAYA**

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1- من نحن
2- لماذا نظام تفاعل حراري
3- لمحة عامة عن المشروع
4- معايير سلامة البيئة
5- نظام التحكم في العمليات
6- استراتيجية وزارة البيئة
7- القيمة المضافة
8- الخطة الحالية

1- من نحن

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North Lebanon Alternative Power

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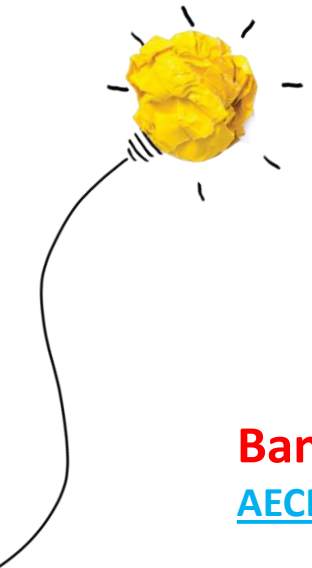
OBJECTIVE AND PURPOSE OF THE ASSOCIATION:

committed to the promotion of international cooperation in the economic and scientific fields in order to achieve the idea of international understanding and a closer relationship between institutions of the Middle East, in Europe and its neighbors.



Banking account data:

AECENAR e.V.,IBAN: DE04 67250020 0009192433,SWIFT-BIC:SOLADES1HDB,Bank Name: Sparkasse Heidelberg, Germany

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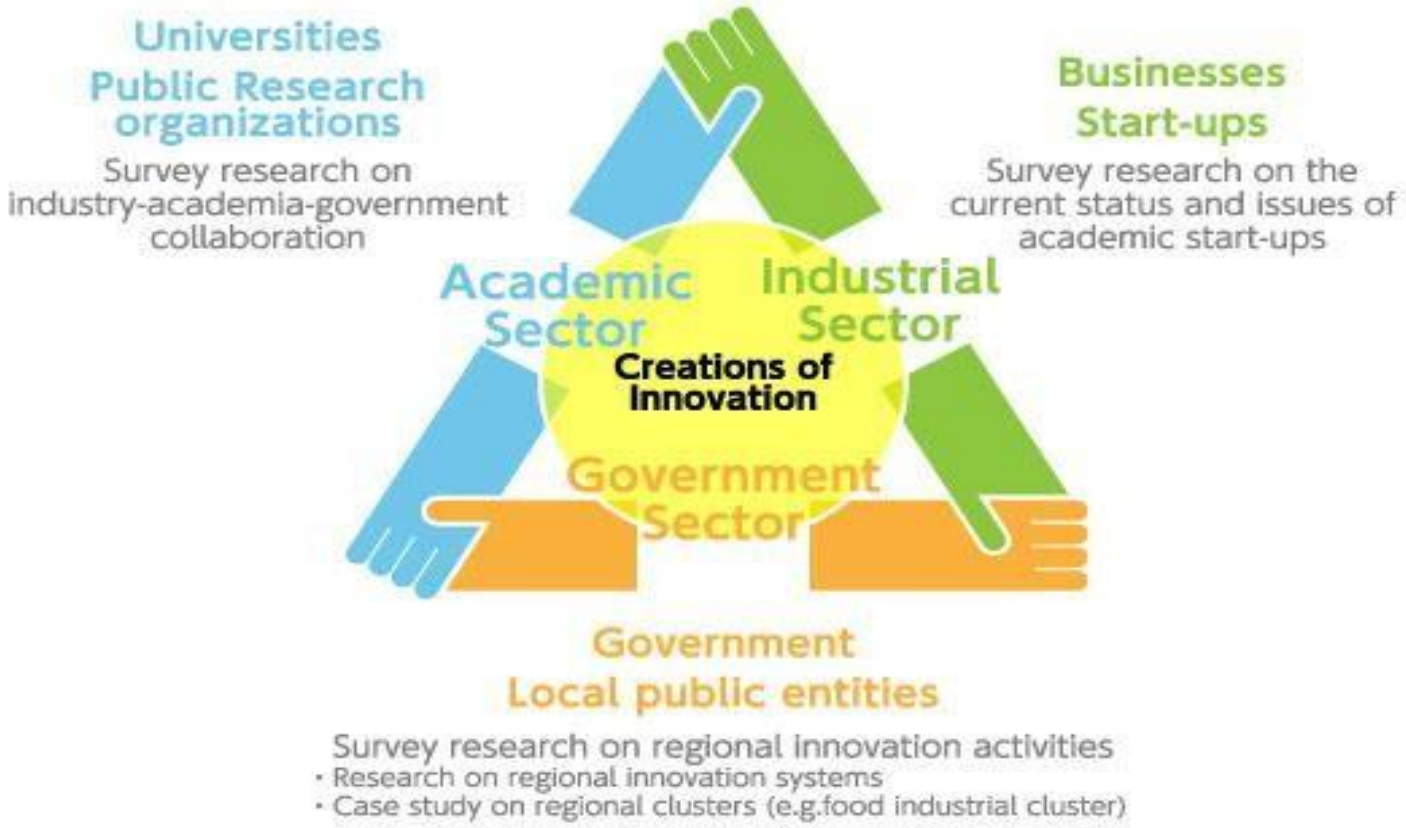

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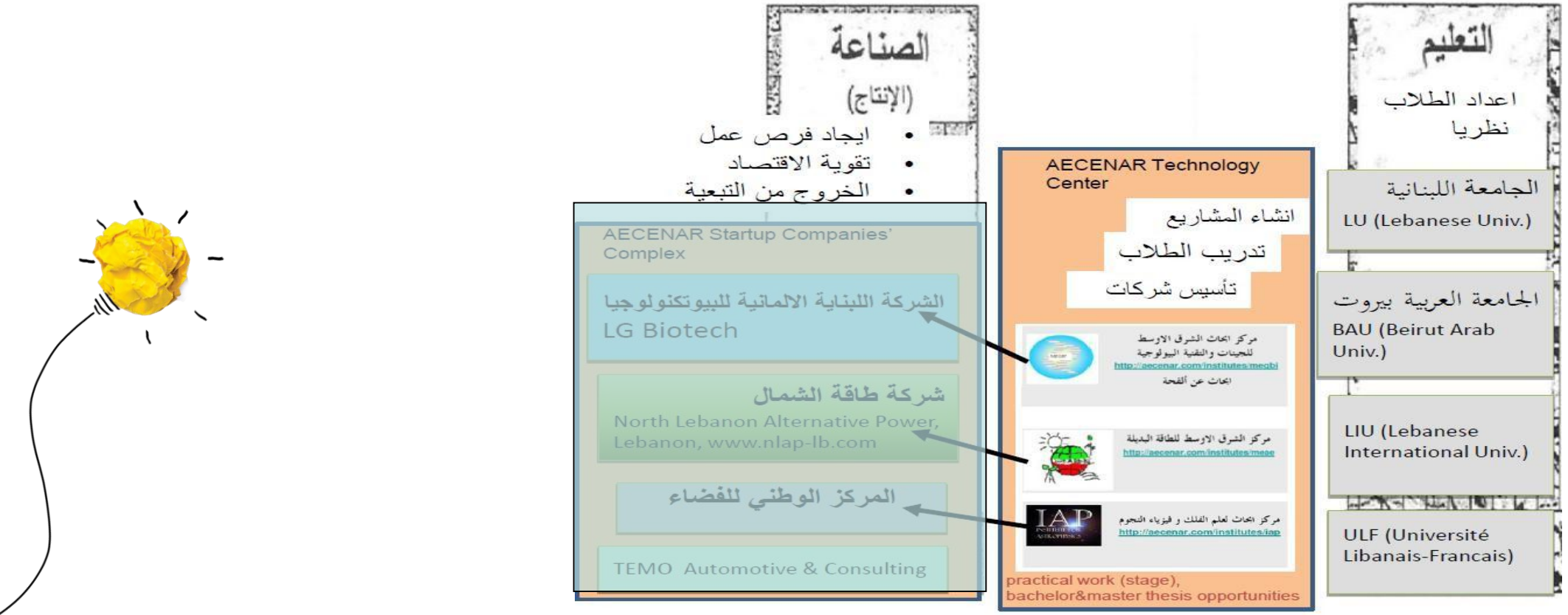

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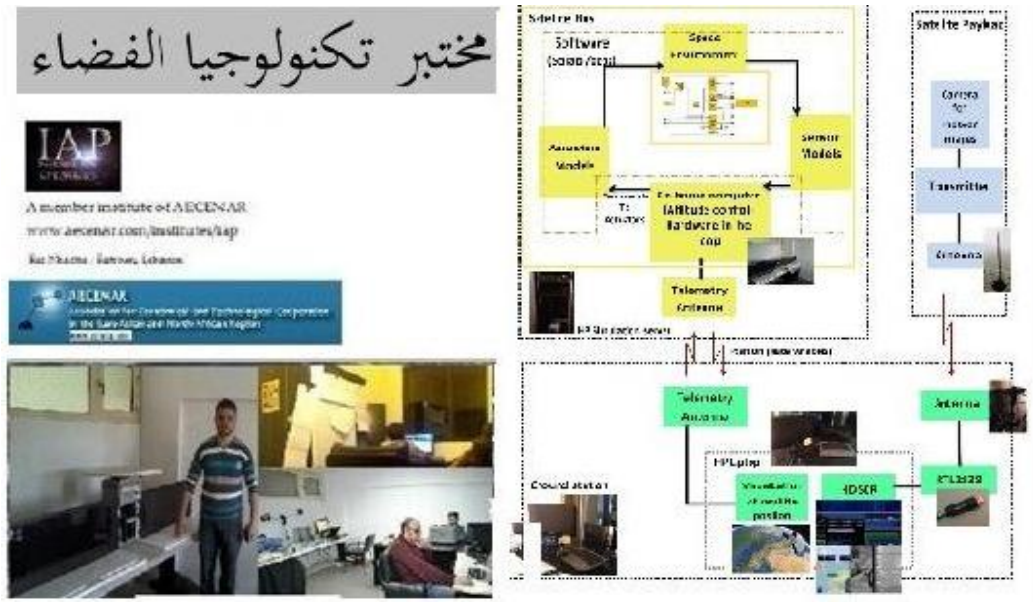
OBJECTIVE AND PURPOSE OF THE ASSOCIATION: Exemple



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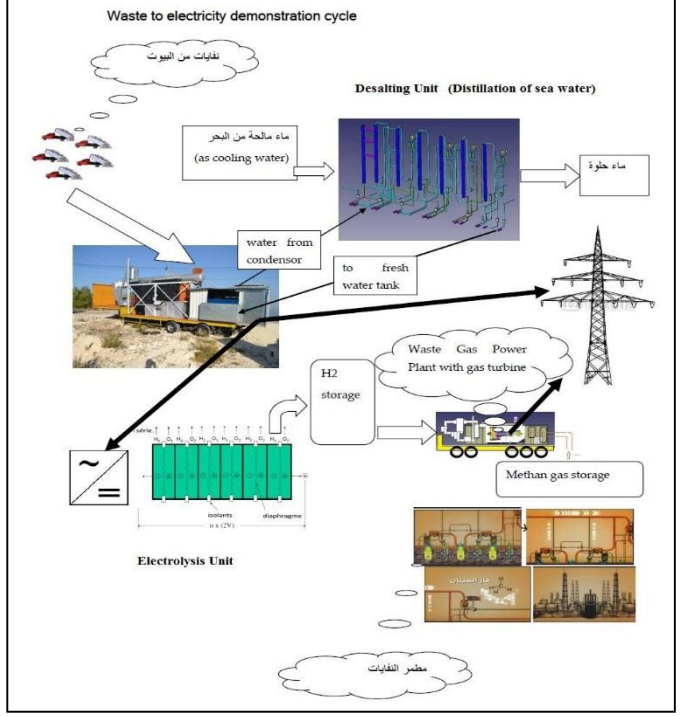
OBJECTIVE AND PURPOSE OF THE ASSOCIATION:

Electrical Power Plant Technology



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2- لمحة عامة عن المشروع

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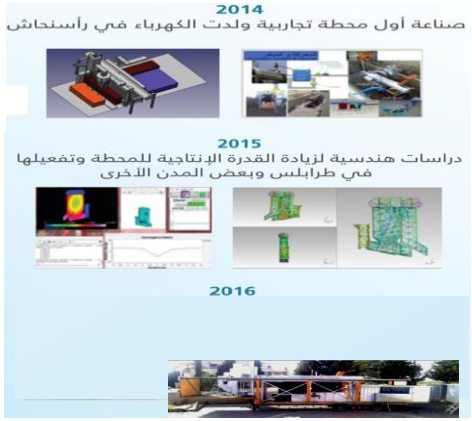
2005 → 2016



2022

2- لمحة عامة عن المشروع

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Incinerator in world

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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2- لماذا نظام التفكك الحراري

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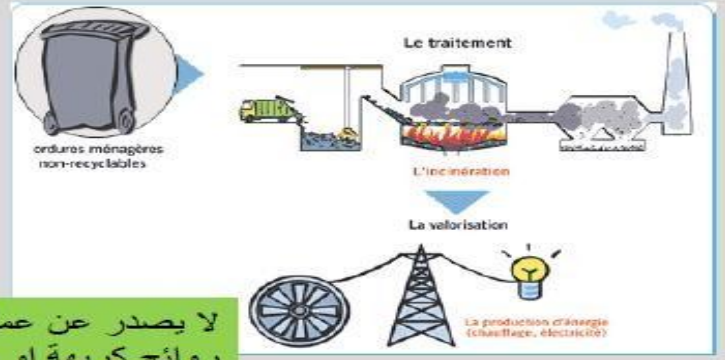
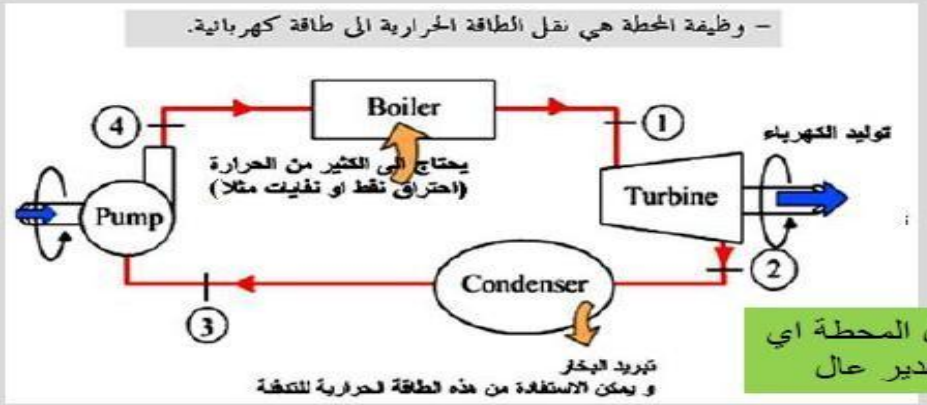
1 محطة طاقة تعمل على حرق النفايات



لا يصدر عن عمل المحطة اي روائح كريهة او هدير عال

2 كيف يتم توليد الكهرباء في المحطة؟

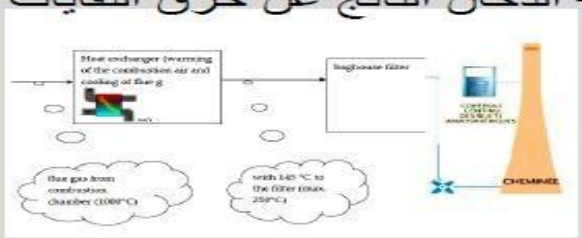


3 فرز النفايات في البيت

ما لا يحرق في المحطة:

~~بطاريات~~
~~زجاج~~
~~حديد~~

4 تنقية الدخان الناتج عن حرق النفايات



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

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)

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3- لماذا نظام التفكك الحراري

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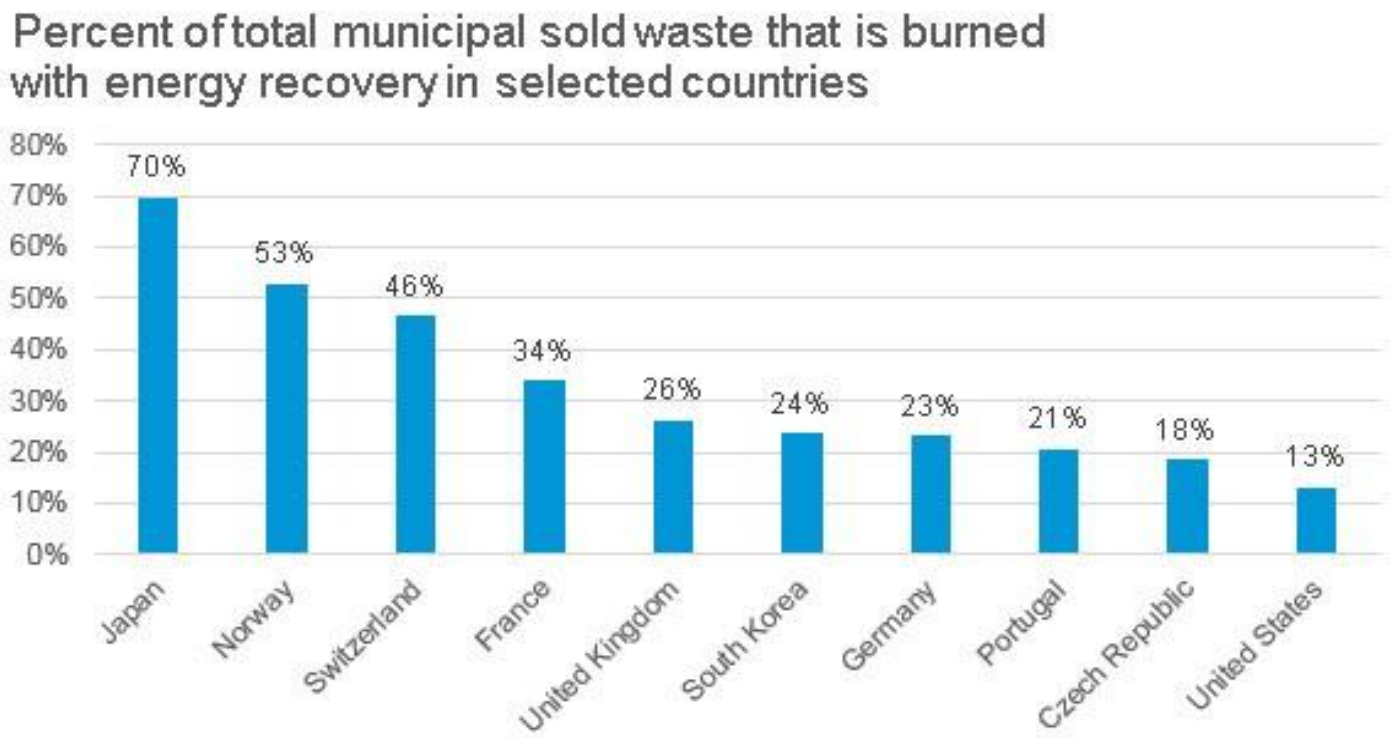

Note: Data for Japan and South Korea are for 2013. Data for other countries are for 2014.
Source: U.S. Environmental Protection Agency for the United States, Organization for Economic Cooperation and Development for other countries

eia

3- لماذا نظام التفكك الحراري

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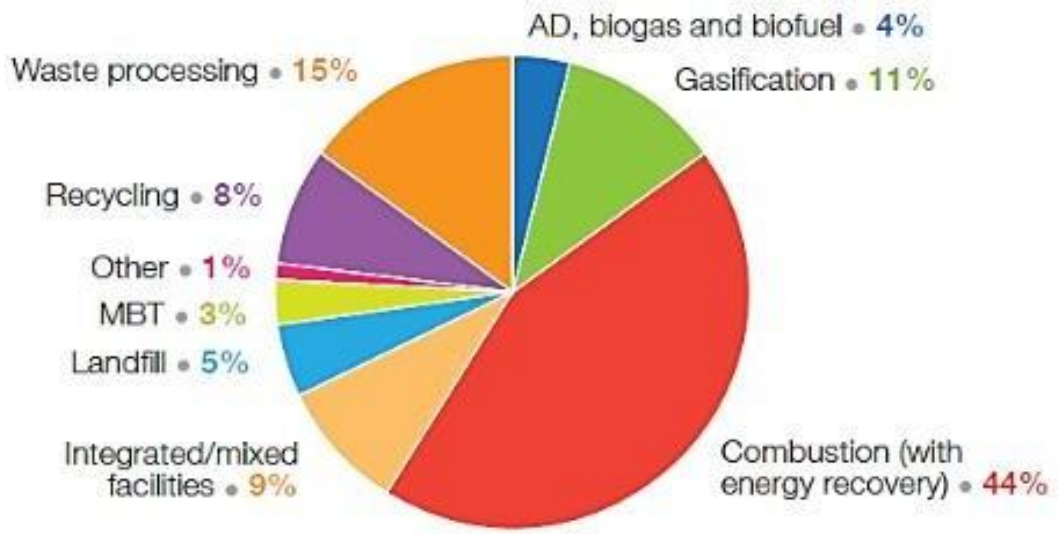
Utility Scale Plants existing according to the technology used

(Data from 93 countries in 20132014
(total of 2723 facilities))



*(Mechanical Biological Treat MBT)

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4- معايير سلامة البيئة

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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:)

Nonharmful to the environment

Nitrogen (N_2), Oxygen (O_2), and water vapor (H_2O)

harmful to the environment

Acid gases: nitrogen dioxide (NO_2), nitrogen oxide (NO), Sulfur dioxide (SO_2), carbon dioxide (CO_2),HCl, Dust

Toxic gases

Furans, dioxins, heavy metals (Hg from batteries, cadmium, plumb, zinc)

4- معايير سلامة البيئة

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1.Techniques for the reduction of nitrogen oxide

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 NONSELECTIVE 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 230300 ° 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.

4- معايير السلامة البيئية

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2.Treatment of dioxin and furans and mercury Hg & CO_2

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.

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=10300 mg/Nm^3)) suggested by the study with a statistical error of +/18%.

Measurement :The Intelligent Gravimetric Analyzer (IGA)
The system is an ultrahigh 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

4- معايير سلامة البيئة

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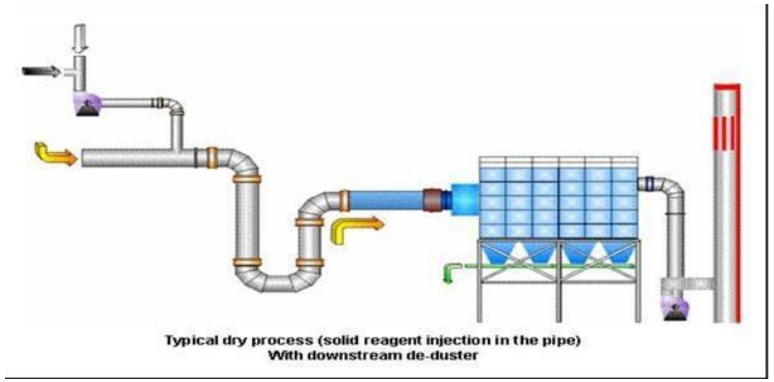
3.Acid gas treatment technologies(HF, HCl and SO_2)


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

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 overstoichiometric (from 1.5 to 3 times).
at least 130200 ° C

- Treatment by $Ca(OH)_2$:

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

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

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

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

- Treatment by $NaHCO_3$:

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

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

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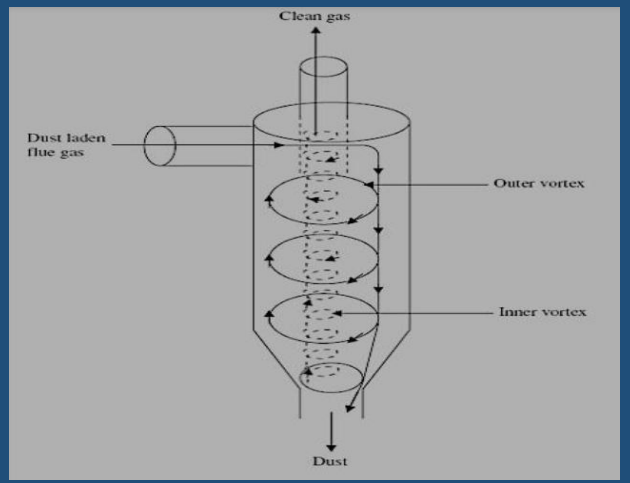
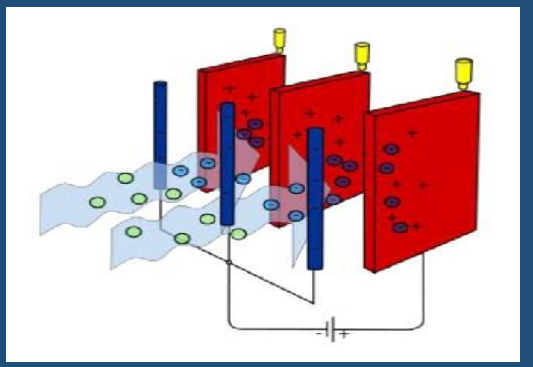
4.Treatment of dust

Particles between 5 & 50 micron and volatized heavy metals	Less than 5 micron
Mechanical treatment : لعلاج لميكانيكي Cyclone(efficiency:91%)	Mechanical treatment : لعلاج لميكانيكي Cyclone(efficiency:91%)





4- معايير سلامة البيئة

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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

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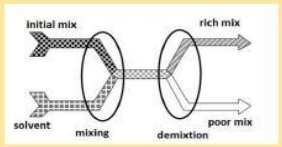
Bottom & flying ashes: heavy metals recovery

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

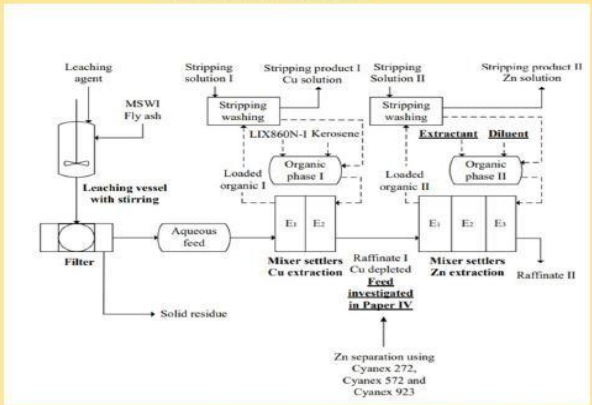
Oxime based extractants for copper are largely based on salicyaldoximes which have been modified with one of three modifier types. Examples of the three main extractant types currently in use are:

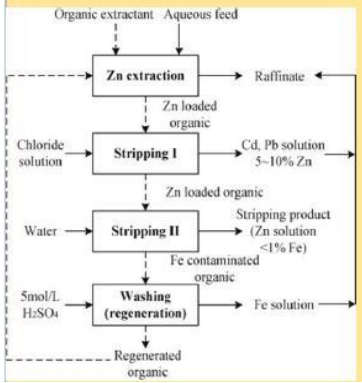
1. LIX® 984N
A mixture of 2-hydroxy-5-nonylacetophenone oxime and 5-nonylsalicylaldoxime in a high flash diluent. The acetophenone oxime modifies the aldoxime and also performs as an extractant in its own right. Molecular Weight:262.393 g/mol.

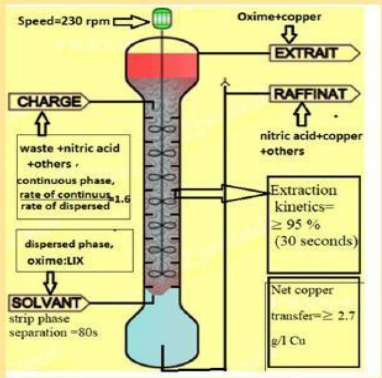
2. Acorga® M5640
5-Nonylsalicylaldoxime modified with an ester, 2,2,4-Trimethyl-1,3-pentanediol Diisobutyrate (TXIB) in a high flash diluent.

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







4- معايير سلامة البيئة

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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	-

m	<1 ton/h	1-3 ton/h	>3 ton/h
Elements (polluants)	Maximum value(mg/m^3)	Maximum value(mg/m^3)	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

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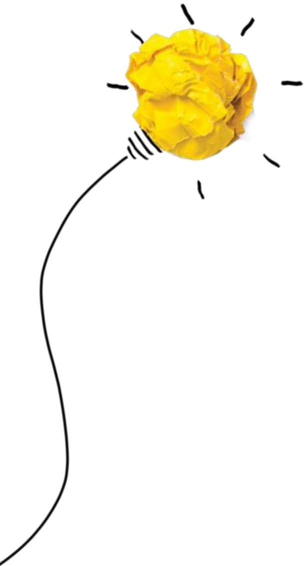

Pressure equipment shall be designed, manufactured, tested and, if necessary, equipped and installed in such a way as to ensure its safety .

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

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.

Design to the required load capacity: EN 12952-3

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

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.

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

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.

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

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]

Fired or otherwise heated overheating-prone pressure equipment in
-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

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;

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.

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.

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.

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

If necessary, suitable devices for draining and venting the pressure equipment must be provided:

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

4- معايير سلامة البيئة

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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

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 الأثر البيئي؟
The project proponent صاحب المشروع يالستعانة 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.

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

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:
- تحدد محتوى ومدى التقييم
تحدد المعلومات التي سيتم تضمينها في تقرير تقييم التأثير البيئي.

Incineration of Waste Directive 2000/76/EC
The aim of the WI Directive is to prevent or reduce as far as possible negative effects on the environment caused by the incineration or co-incineration of waste, in particular, it should reduce pollution caused by emissions into the air, soil, surface water and groundwater, and the human risks which the exposure 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 (NOx), 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 تخصوص 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.

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5- نظام التحكم في العمليات

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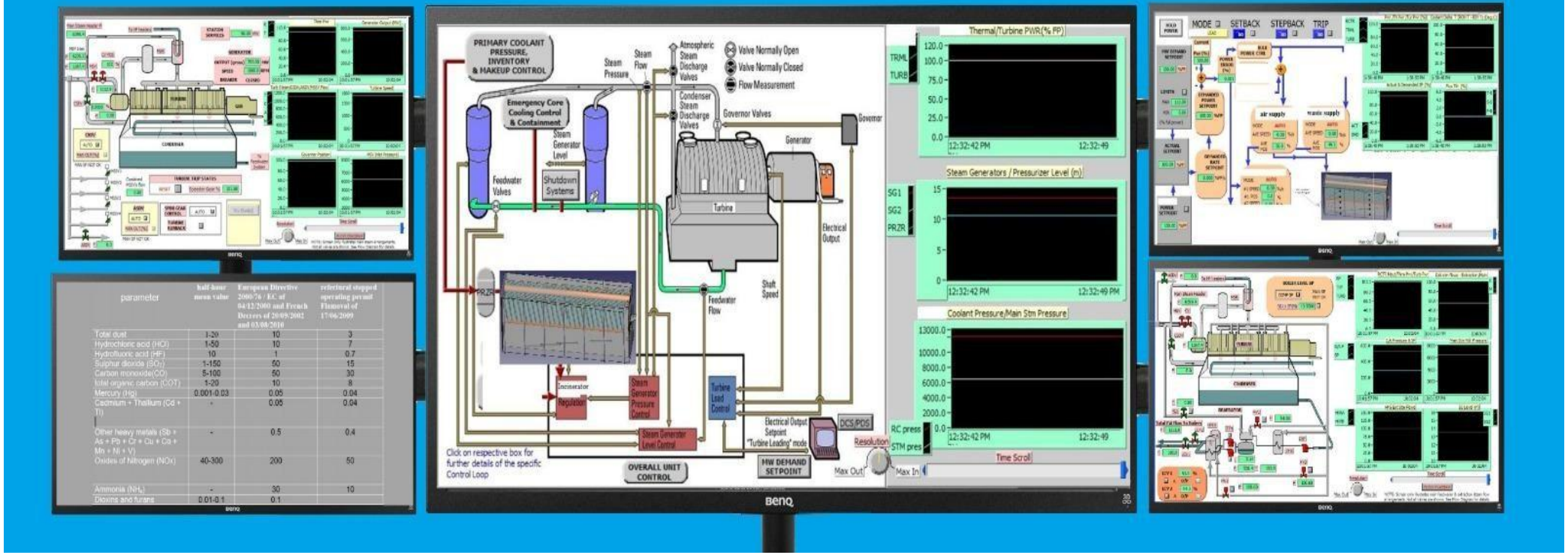
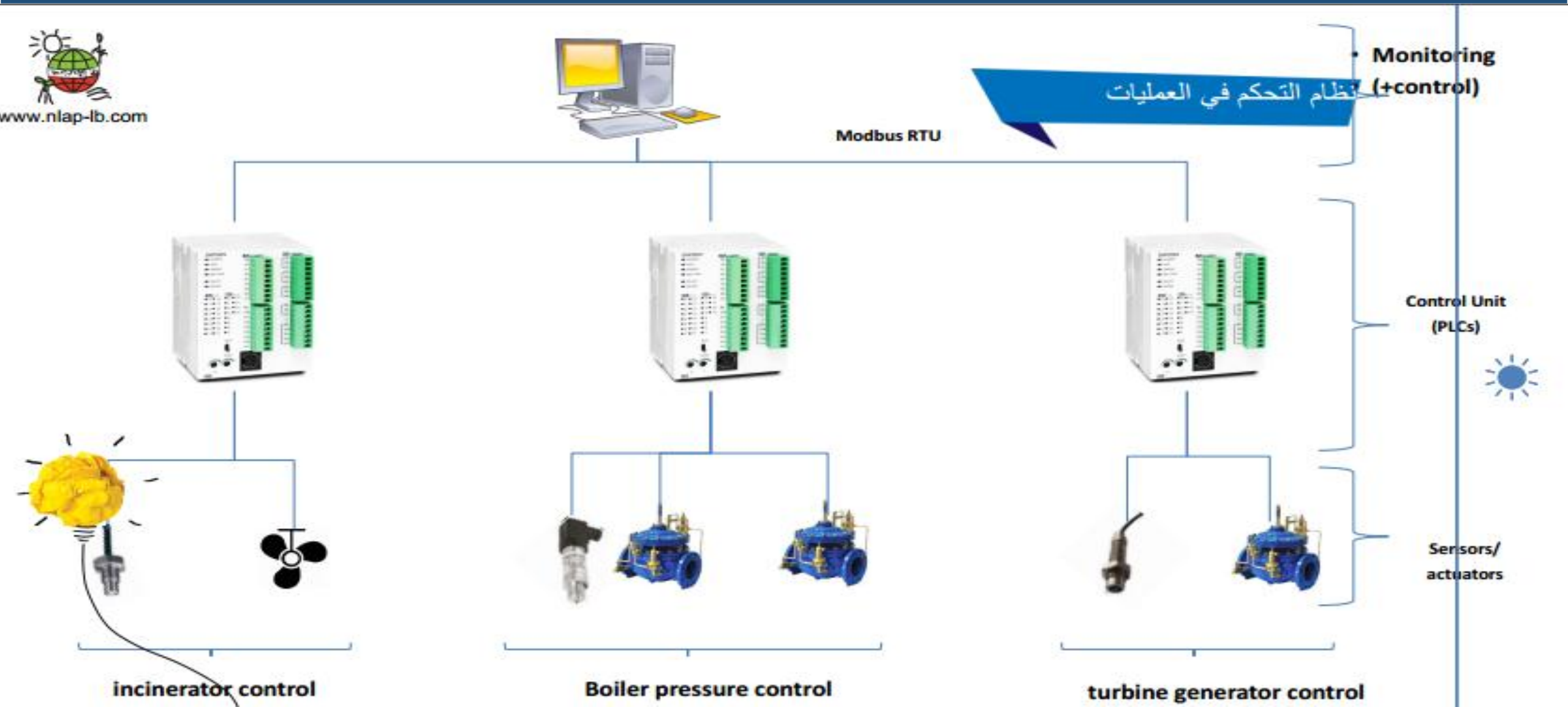


5- نظام التحكم في العمليات



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نظام مراقبة تلوث الهواء على الانتزنت

6- استراتيجية وزارة البيئة

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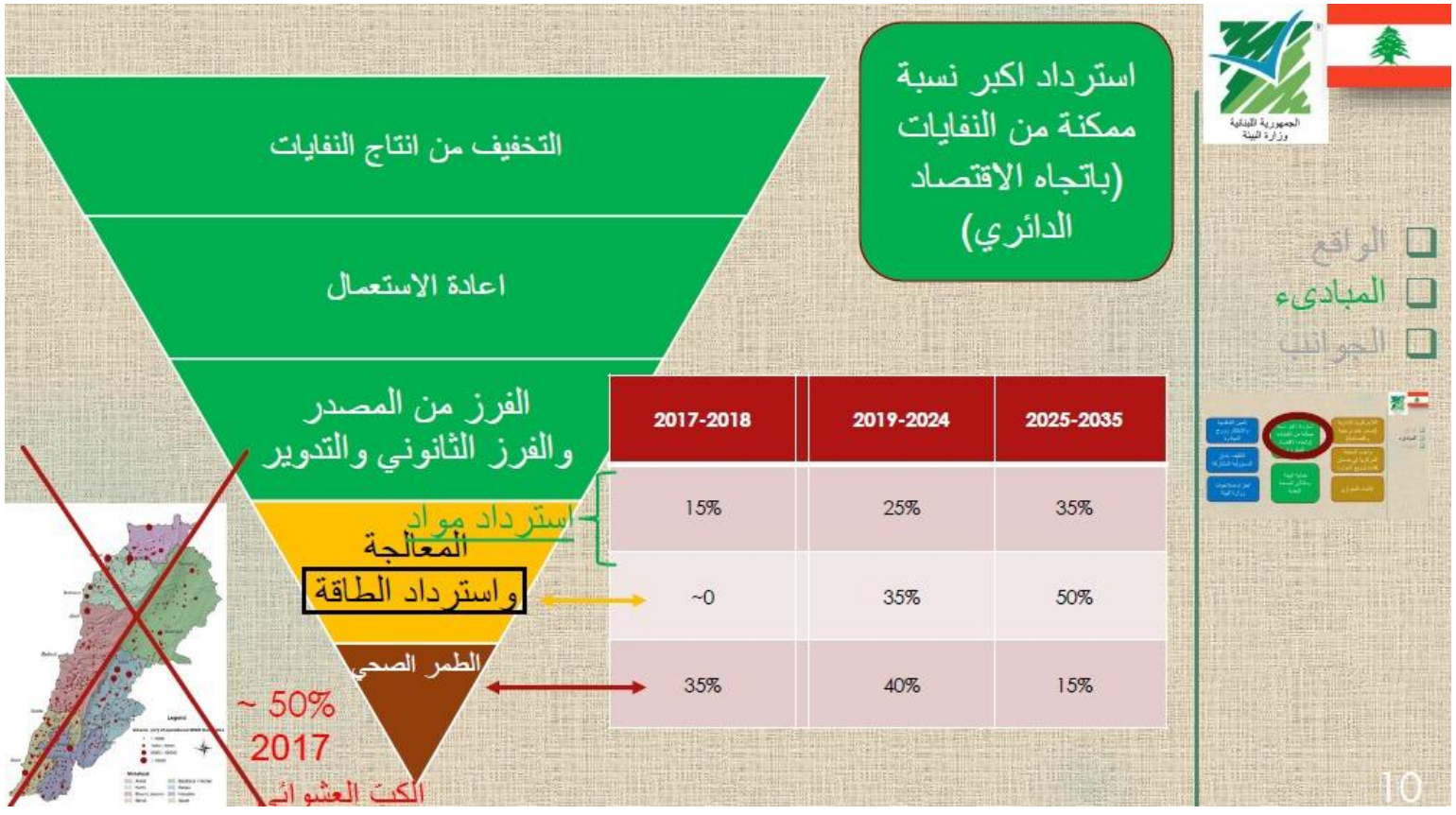
وزراة البيئة تشجع معالجة النفايات لاسترداد الطاقة



	2017-2018	2019-2024	2025-2035
استرداد مواد المعالجة واسترداد الطاقة	15%	25%	35%
	~0	35%	50%
الطمر الصحي	35%	40%	15%

7- القيمة المضافة

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1- تامين فرص عمل
2- صناعة محلية لكامل المصنع تكون اوفر
3- معالجة لمشكلة النفايات المزمنة في الحال (جبل النفايات – النفايات اليومية)
4- تقليل العجز في الكهرباء
5- الاستفادة من بقايا الحرق لصيانة وتعبيد الطرقات
6-اعادة تدوير المعادن

8- الخطة الحالية

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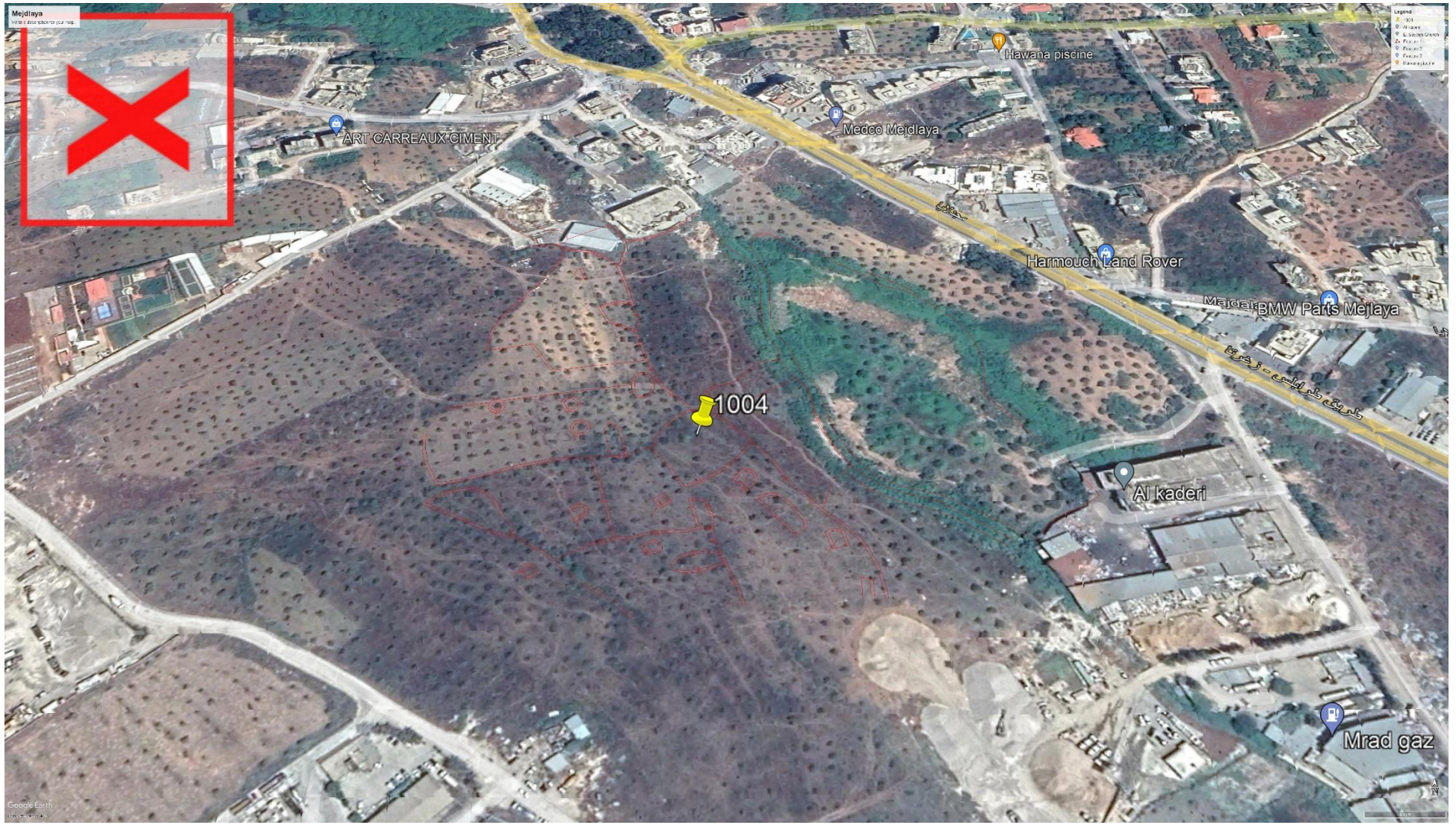

8- الخطة الحالية

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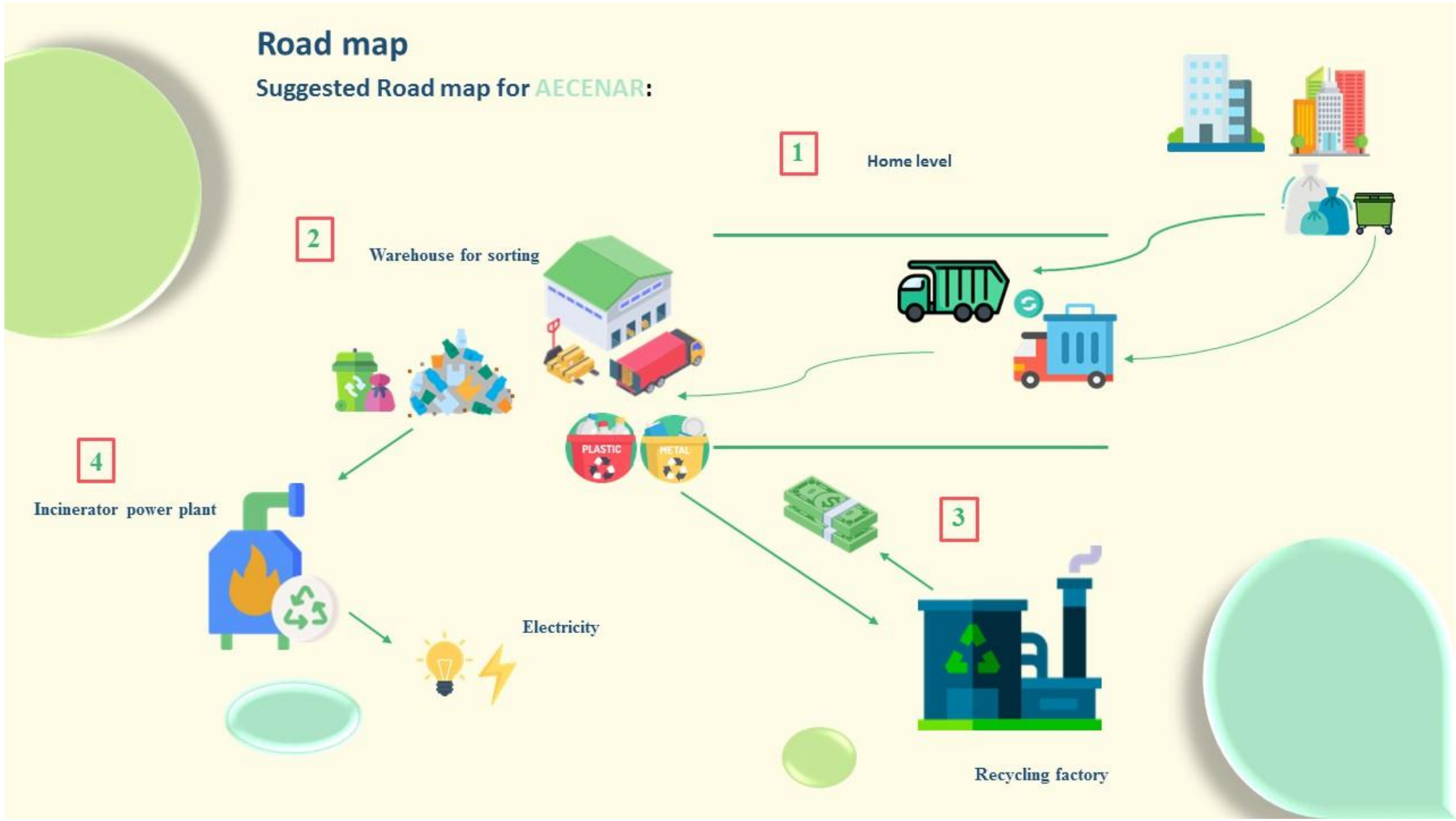

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Waste management scenario

Step1: Home level cost

Wide range :2 ton/day

Raw materials

1

Home level

2 tonnes

1 big truck

In collaboration with Lavajet company

Fuel

615$/month

580 L.L/Day

Cleaners

1 million/month/ pers
A discuter####

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Waste management scenario
Step 2-3: Warehouse for sorting

Raw materials

Cost rent Warehouse

Sorting workers

Security guard

Recycling factory

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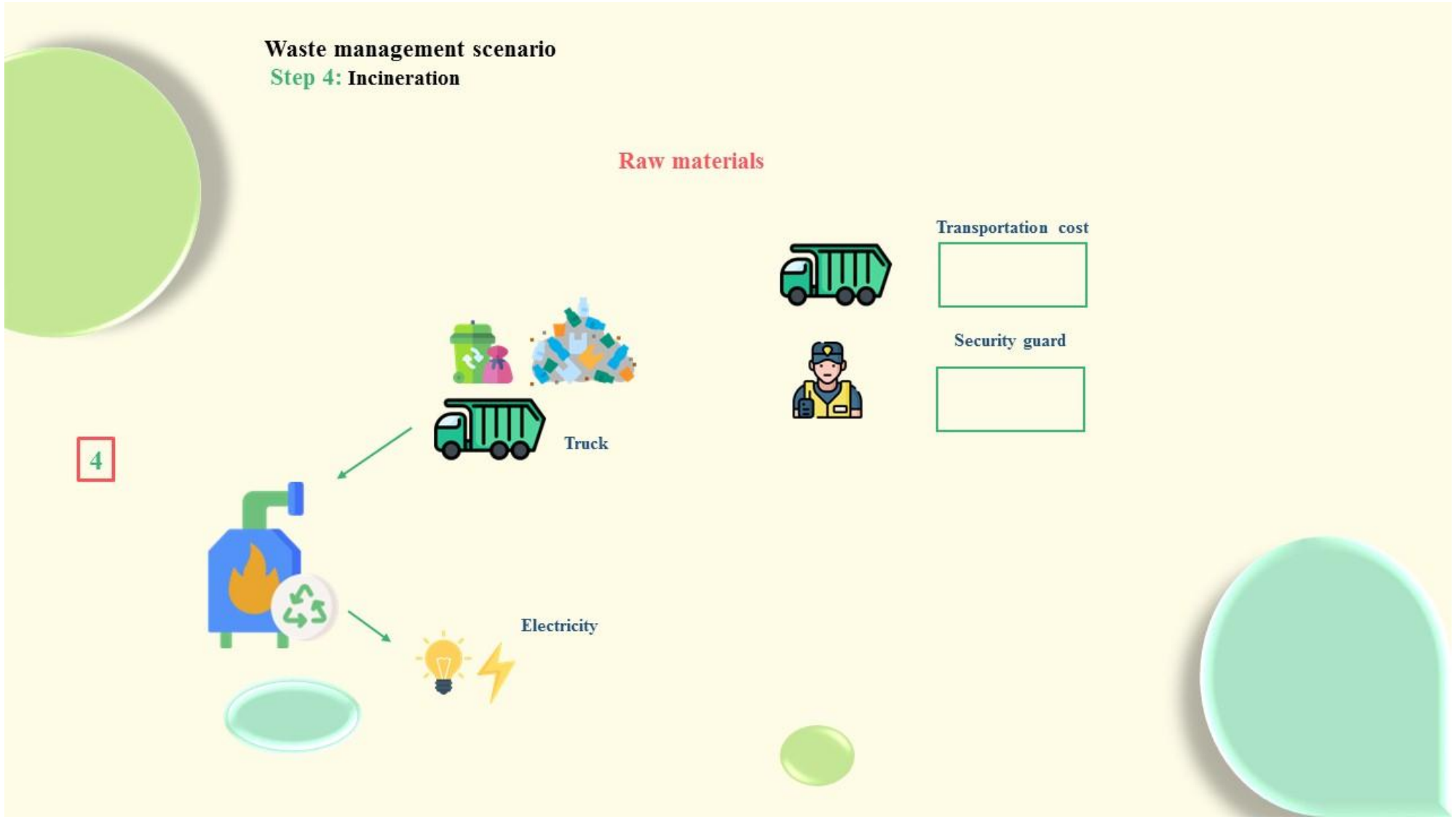

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