QHSE
Environment
Eco-design

Manuel Paredes
Overview

https://moodle.insa-toulouse.fr/course/view.php?id=52

This presentation can be downloaded

1) An **individual** test as to be performed using moodle. Minimum mark of 30/40 required

2) Eco-design will be exploited with the mechatronics project => group mark
What’s Eco-design?

- Eco-design consists in integrating the environment part right from product design phase, whether goods, services.

- This integration is based on a global and multi-criteria environmental approach and is based on taking into account all stages of the product life cycle.
Life cycle
Environment: impacts

- Ozone layer
- Greenhouse effect
- Resource depletion: Matter, Energy
- Biodiversity loss
- Depletion of water resources
- Land Occupation

Water Pollution:
- Noise
- Odour
- Accidents
- Allergies
- Serious Diseases
- Heavy Metals, Pesticides
- Fertility problems, genetic diseases

Impacts on flora and fauna

Acidification

Smog, presence of ozone in summer

CO₂
Influence of cost of energy
Electricity: mean price of the kWh in Europe in 2016

<table>
<thead>
<tr>
<th>Country</th>
<th>Price in euros / kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danemark</td>
<td></td>
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<tr>
<td>Allemagne</td>
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<td>Belgique</td>
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<td>Italie</td>
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<td>Portugal</td>
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<td>Irlande</td>
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<td>Autriche</td>
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<td>Royaume-Uni</td>
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<td>Suède</td>
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<td>Grèce</td>
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<td>Luxembourg</td>
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<td>France</td>
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<td>Liechtenstein</td>
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<tr>
<td>Lettonie</td>
<td></td>
</tr>
<tr>
<td>Pays-Bas</td>
<td></td>
</tr>
</tbody>
</table>

=> Influences the development of alternative energies

http://ec.europa.eu/eurostat/web/energy/data/main-tables
Types of energies in France

Graphique 2 : consommation primaire (corrigée des variations climatiques) par forme d'énergie

Note : l'énergie nucléaire est comptabilisée en équivalent primaire à la production (chaudière dégagée par la réaction nucléaire, puis convertie en électricité), déduction faite du solde exportateur d'électricité.

Source : SDES

What benefits for a company?

- In groups, you have 5 minutes to give 3 reasons for a company to be interested in eco-design.
What benefits for a company?

- Anticipate future standards and certifications
- Cost reduction (raw materials)
- Understand the issues of recycling
  - Influence on future standards
- Shaping an environmental policy
- Respond to customer requests
- Company's attractiveness for employees
- Reduce the environmental impact
What benefits for a company?

Answer of a US office furniture manufacturer company with $3 billion turnover in 2014
Plenary Presentation at the Colloquium AIP-PRIMECA 2015

- Anticipate future standards and certifications
- Cost reduction (raw materials)
- Understand the issues of recycling
  - Influence on future standards
- Shaping an environmental policy
- Respond to customer requests
- Company's attractiveness for employees
- Reduce the environmental impact
Outline

1. Recycling issues
2. Regulatory context
3. Industrial examples
4. Practical approach to eco-design
5. Research
Recycling issues: Raw materials Pb
(Circular economy)

Raw materials

Waste
Recycling issues: Raw materials pb

Evolution of design priorities

- Functional
- Affordable
- Esthetical
- Safe
- (locally) green
- Sustainable ??
Recycling issues: Raw materials pb

Several thousand of tonnes of material each year

7 % of the periodic table
Recycling issues: Raw materials pb

Eighty million of tonnes of material each year

Of which, 25 are critical elements
Recycling issues: Raw materials pb

Raw materials requirements (3)

Eighty million of tonnes of material each year

Issue of dependence: Risks and safety of supply chains

The answer: “Sustainable development”
Environment: end of life

- Sorting
  - Reuse
  - Recovery
    - Valorisation
  - Waste
  - Recycle
    - Raw materials
  - Energy
Environment: end of life

Reuse

Recovery
- Broken and recast for same use
- Broken and recast for degraded use

Waste

Recycle
Raw materials

Sorting

Cleaning
Environment: end of life

- Crushed for degraded use
- Incineration
Environment: end of life

- Reuse
- Recovery
- Waste

Privileged: storage in deserts

- Recycle
  Raw materials

Overall not profitable
Question

What is the main benefit of ecodesign for the company presented during the class?

1 - Shaping an environmental policy
2 - Anticipate standards
3 - Costs reduction
4 - Reduce environmental impact
5 - Be presented at INSA Toulouse

https://iquiz.univ-toulouse.fr/index.html
Outline

1. Recycling issues
2. Regulatory context
3. Industrial examples
4. Practical approach to eco-design
5. Research
Extended Producer Responsibility
Polluter pays principle

An approach to environmental policy that the responsibility of a producer is extended to all post-consumer phase, that is to say the entire life cycle of a product.

**Producer:** manufacturers, importers, distributors
Extended Producer Responsibility

- Prevention and reduction of waste
- Integration of internal and external costs
- Setting national recycling and waste recovery targets
- Financing of public service in charge of establishing new recovery systems

Article L. 541-10 of the Environmental Code
Extended Producer Responsibility
*Responsabilité Etendue du Producteur*

Generic scheme of the E.P.R.

- Communities
- Producers
- Federations Channels
- Approved Eco-organization
- Recycler

800 M€ / year in France

Member-ship

Recovery agreement

Recovery contracts

Contracts
Waste streams involved in E.P.R.

- Waste electrical and electronic equipment (WEEE)
  - End-of-Life Vehicles (E.L.V)
  - Used motor oils
  - Used tires
  - Used batteries
  - Waste graphic papers
  - Household packaging waste
  - Used textiles
  - Unused medicines (« MNU »)
Waste electrical and electronic equipment (WEEE)

Les déchets d’équipements électriques et électroniques (DEEE)


Directive 2002/95/CE of 27 January 2003 on hazardous substances in such equipment
WEEE : main principles

Coverage of all electrical and electronic equipment falling under ten categories, distinguishing between professional and household equipment,

The prohibition on the use of six substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls and polybromodiphenylséthers) in the EEA, unless express authorization for certain applications where the substitution of these substances is not technically possible at this stage,

The collection of WEEE, with a minimum collection target of 4kg of household WEEE per inhabitant per year,

Systematic selective treatment of hazardous substances and components in the EEA and the achievement of objectives of reuse / recycling and recovery of WEEE.
WEEE : arrangements in France

Distributors of household appliances have the **obligation** to take back household WEEE free of charge reported by consumers when selling similar equipment, as part of the recovery arrangement called "one for one". More and more distributors offer, on a voluntary basis, free recovery of small used equipment, no obligation to buy.

Local authorities may, on a voluntary basis, establish a collection arrangement for household WEEE, as part of their rubbish dump in particular.

Reuse actors also take back used equipment which might be put into working condition.
WEEE : key figures for 2015

The collection of WEEE, with a minimum collection target of 4kg of household WEEE per inhabitant per year

http://ec.europa.eu/eurostat/web/waste/key-waste-streams/weee
Waste streams involved in E.P.R.

- Waste electrical and electronic equipment (WEEE)
- End-of-Life Vehicles (E.L.V)
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- Waste graphic papers
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- Used textiles
- Unused medicines (« MNU »)
End-of-Life Vehicles (E.L.V)

Les véhicules hors d’usage (V.H.U)
End-of-Life Vehicles (E.L.V)

Les véhicules hors d’usage (V.H.U)


Vehicles can be put on the market only if:

- A minimum rate of reuse and recycling of 85% of the mass of ELVs;
- A minimum rate of reuse and recovery to 95% of the mass of ELVs.

Risks: € 75 thousand and 2 years imprisonment

http://www.recyclermavoiture.fr/
http://ec.europa.eu/environment/waste/elv/
https://www.youtube.com/watch?v=Kj2wjMjsoOE
A minimum rate of reuse and recycling of 85% of the mass of ELVs
Waste streams involved in E.P.R.

- Waste electrical and electronic equipment (WEEE)
- End-of-Life Vehicles (E.L.V.)
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- Waste graphic papers
- Household packaging waste
- Used textiles
- Unused medicines (« MNU »)

Induces an interest for Managing life cycle
Question

Fertility problems are a …

1 – Local, Short term impact
2 – Global, Short term impact
3 – Local, Long term impact
4 – Global, Long term impact
5 – Mean space and time impact

https://iquiz.univ-toulouse.fr/index.html
Managing life cycle

Lot n° 2015-992 du 17 août 2015 relative à la transition énergétique pour la croissance verte

Titre IV : LUTTER CONTRE LES GASPILAGES ET PROMOUVOIR L'ÉCONOMIE CIRCULAIRE : DE LA CONCEPTION DES PRODUITS À LEUR RECYCLAGE

Section 2 bis Obsolescence programmée
Planned obsolescence
Section 2 bis obsolescence programmée

« Art. L. 213-4-1.-I.-L'obsolescence programmée se définit par l'ensemble des techniques par lesquelles un metteur sur le marché vise à réduire délibérément la durée de vie d'un produit pour en augmenter le taux de remplacement.

« II.-L'obsolescence programmée est punie d'une peine de deux ans d'emprisonnement et de 300 000 € d'amende.

« III.-Le montant de l'amende peut être porté, de manière proportionnée aux avantages tirés du manquement, à 5 % du chiffre d'affaires moyen annuel, calculé sur les trois derniers chiffres d'affaires annuels connus à la date des faits. »
Outline

1. Recycling issues

2. Regulatory context
   1. EPR
   2. REACH
   3. Aeronautics

3. Industrial examples

4. Practical approach to eco-design

5. Research
**REACH** is an European Regulation (Regulation No 1907/2006) to **secure the manufacture and use of chemicals in the European industry.**

It consists in identifying, assessing and controlling the chemical substances manufactured, imported, placed on the European market.

By 2018, more than 30 000 chemicals will be known and their potential risks will be established.

http://www.developpement-durable.gouv.fr/REACH,30375.html
Acronym REACH

Registration = Registration of all chemical substances manufactured or imported in the European market (tonnage > 1 t/y) by 2018.

Evaluation = Evaluation of testing proposals, registration files and substances

Authorisation = Authorisation of SVHC (Substances of Very High Concern)

of CHemicals = Chemical Substances
REACH : objectives

☐ Protect human health and the environment from the potential risks of chemical substances.

☐ Establish a comprehensive and transparent information on the nature and risks of the substances from supplier to end customer.

☐ Secure handling of chemicals by employees in the company by requiring compliance with safety standards.

☐ Strengthen competitiveness in the industry, in particular the European chemical industry.
REACH : Conditions

Mandatory reporting to use or import more than 1 ton / year

- The substance is declared safe: it can be used

- The substance of the risks that can be controlled by precautions for use: the substance can be used under certain conditions

- The substance presents some risks: its use is regulated or prohibited (and it must be replaced by a substitute substance)

Help on: http://reach-info.ineris.fr/
REACH : Safety Data Sheets (FR: FDS)

Les fiches de données de sécurité : mode d’emploi

Si vous utilisez des substances ou mélanges dangereux ou répondant aux autres critères définis à l’article 31 du règlement Reach, vos fournisseurs sont tenus de vous procurer une fiche de données de sécurité conforme à la réglementation.

Pourquoi est-ce important ?
La fiche de données de sécurité (FDS) permet d’acquérir des informations concises sur les dangers des substances et des mélanges utilisés dans vos produits. Elle détaille notamment les mesures à prendre pour les manipuler, précise leur classification et leur étiquetage. Passée d’amont en aval dans la chaîne d’approvisionnement, elle est établie sous la responsabilité de chaque fournisseur, du premier responsable de la mise sur le marché aux utilisateurs, qui peuvent l’enrichir pour en faire un outil de traçabilité complet.

Réformée par le règlement Reach, la FDS peut présenter, sous certaines conditions, des scénarios d’exposition (SE) en annexe. Un SE décrit l’ensemble des conditions dans lesquelles des substances dangereuses peuvent être utilisées en toute sécurité.

Le présent document se limite aux rubriques de la FDS les plus significativement modifiées par les règlements Reach et CLP (Classification, labelling and packaging).
REACH : Safety Data Sheets

Contents

- Identification of the substance or mixture
- Identification of the company or firm
- Identification of risks
- Composition, Information on components
- Handling and storage
- Exposure controls and individual protection
- Regulatory information
REACH: Safety Data Sheets

**SDS circuit between suppliers and customers**

**Downstream:** information by suppliers on the risks of the substance or mixture

- **Suppliers** (manufacturers, importers, distributors)
- **Downstream users** (Inc. mixture formulators)
- **Final users**

**Upstream:** the downstream user may inform, the supplier about its use so as to be identified
Outline

1. Recycling issues
2. Regulatory context
   1. EPR
   2. REACH
   3. Aeronautics
3. Industrial examples
4. Practical approach to eco-design
5. Research
Requirements for aeronautics?

2020 Vision:

In 2000, a strategic agenda was set by the Advisory Council for Aeronautics Research in Europe (ACARE) to develop the technology on new aircraft to meet the following objectives by 2020:

- Greenhouse gases: 50% reduction in CO2 (carbon dioxide) emissions
- Local pollutants: 80% reduction in NOx (nitrogen oxide) emissions
- Noise: 50% reduction in perceived noise

www.aerorecherchecorac.com
2050 Vision:

This new long-term strategy prepared for the European Commission in early 2011 by a high-level group representing several industry sectors (infrastructure, aircraft, operation, fuels and research) calls for all parties to work towards a cleaner, safer, more competitive and reliable aviation sector by 2050, while at the same time paying particular attention to the needs of society and its citizens. The main environmental objectives applicable to new aircraft for 2050 are:

- A 75% reduction in CO2 emissions per passenger/km
- A 90% reduction in NOx emissions
- A 65% reduction in perceived noise taking 2000 as the reference year.

Requirements for aeronautics?

Greenhouse gases: 50% reduction in CO2 (carbon dioxide) emissions
Local pollutants: 80% reduction in NOx (nitrogen oxide) emissions
Noise: 50% reduction in perceived noise
Outline

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Industrial examples

1- Bombardier

https://www.youtube.com/watch?v=r42_Qm0YzcU
Industrial examples

2- Airbus

Documents on the environmental commitment
Outline

1. Recycling issues
2. Regulatory context
3. Industrial examples
4. Practical approach to eco-design
   1. LCV (Fr: ACV)
   2. Environmental questionnaire
5. Research
Life Cycle Assessment? (Analyse de cycle de vie)

- Analysis based on a **global and multi-criteria environmental approach** and is based on taking into account all stages of the product life cycle.
Example of a LCA

Studied system: coffee maker

Impacts by phase of life

- Production phase
- Transportation phase
- Use phase
- End of life

Indicators:
- Energy consumption
- Resource consumption
- Greenhouse effect
- Acidification
- Eutrophication (air, water ground)
- Photochemical pollution
- Aquatic ECO toxicity
- Human toxicity

Points (in equivalent day of an average European)
Example of a LCA

Impacts by phase of life

Studied system: coffee maker

<table>
<thead>
<tr>
<th>Phase of Life</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>Non renewable energy (in mega joules (MJ))</td>
</tr>
<tr>
<td>Transportation</td>
<td>Fossil energies consumed</td>
</tr>
<tr>
<td>Use</td>
<td></td>
</tr>
<tr>
<td>End of life</td>
<td></td>
</tr>
</tbody>
</table>

Non renewable energy
In mega joules (MJ)
Fossil energies consumed
Example of a LCA

**Studied system:** coffee maker

**Impacts by phase of life**

- **End of life**
- **Use phase**
- **Transportation phase**
- **Production phase**

**Indicators**

- Scarce resources
  - In kg eq. Antimony (kg of Sb$_{eq}$)
- Rare material (excluding fossil energy)

---

**Scarce resources**

In kg eq. Antimony (kg of Sb$_{eq}$)

Rare material (excluding fossil energy)
Example of a LCA

Impacts by phase of life

Studied system: coffee maker

Indicators:
- Greenhouse effect
  - In kg of CO$_2$ eq (Carbon footprint)
  - => Climate change

Diagram showing the greenhouse effect in kg of CO$_2$ eq for different phases and indicators.
Example of a LCA

Impacts by phase of life

**Studied system:** coffee maker

Point(s) – in equivalent day of an average European

**End of life**

**Use phase**

**Transportation phase**

**Production phase**

**Indicators**

**Greenhouse effect**

In kg of CO$_2$ eq (Carbon footprint)

=> Climate change

**Carbon Footprint**
Example of a LCA

Impacts by phase of life

Studied system: coffee maker

- Indicators:
  - Acidification
    - In kg of SO$_2$ eq
    - Potential for acid rain
    - => Decreased productivity
    - Of natural ecosystems

Graph showing acidification impacts across different phases of a coffee maker's life cycle.
Example of a LCA

Studied system: coffee maker

Eutrophication
In eq of phosphate $\text{PO}_4^{3-}\text{eq}$
Enrichment of nutrient waters
$\Rightarrow$ Reduced biodiversity of wetlands

Indicators

- End of life
- Use phase
- Transportation phase
- Production phase
Example of a LCA

**Studied system:** coffee maker

**Impacts by phase of life**

- **End of life**
- **Use phase**
- **Transportation phase**
- **Production phase**

**Indicators**

- Tropospheric ozone
  - In kg of PO$_4^{3-\text{eq}}$
  - Tropospheric ozone formation potential
  - $\Rightarrow$ Respiratory problems
Example of a LCA

**Impacts by phase of life**

Studied system: coffee maker

<table>
<thead>
<tr>
<th>Phase of Life</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>End of life</td>
<td>Aquatic Eco toxicity</td>
</tr>
<tr>
<td></td>
<td>In kg eq of 1,4 dichlorobenzene (kg of ( p-\text{DCB}_{\text{eq}} ))</td>
</tr>
<tr>
<td></td>
<td>Freshwater Eco toxicity toxic substances over 100 years</td>
</tr>
</tbody>
</table>

**Example of a LCA**

**Studied system:** coffee maker
Example of a LCA

Studied system: Coffee maker

Impacts by phase of life

Indicators

- Human Eco toxicity
  - In kg eq of 1,4 dichlorobenzene (kg of \( p\)-DCB\(_{eq}\))
  - Human Eco toxicity toxic substances over 100 years
Resources for LCA

- Product assessment of ADEME
  - www.ademe.fr

- ArtoACV
  - www.artogreen.com
  - Account: ferrand@insa-toulouse.fr
Question

In France, planned obsolescence is punished by how many years in jail? (select the number)

1 – One year
2 – Two years
3 – Three years
4 – …

https://iquiz.univ-toulouse.fr/index.html
Outline

1. Recycling issues
2. Regulatory context
3. Industrial examples
4. Practical approach to eco-design
   1. LCV (Fr: ACV)
   2. Environmental questionnaire
5. Research
Environmental questionnaire

- For the preliminary draft
- For Design or redesign
- To determine key areas of work
Resources for the questionnaire

- The standard NF E01-005 [www.afnor.org](http://www.afnor.org)
- Artodesign Tool
- Summary table
The Standard NF E01-005
Environmental Profile Criteria

- Raw Materials (RM, Fr: MP)
- Manufacturing (M, Fr: F)
- Use (U)
- Recyclability at end of life (Fr: FV-R)
- Hazardous Substances (S)
- Transport (T)
- Packaging (Pkg, Fr: Emb)

Gives a picture of the most important environmental aspects to be considered for product eco-design
Resources for the questionnaire

- The standard NF E01-005 [www.afnor.org](http://www.afnor.org)
- Artodesign Tool
- Summary table
ArtoDesign Tool

- 50 questions
  - Metallic part, 9 criteria
    - (1-2-5-6-7-8-9-10-19)
  - Plastic part, 10 criteria
    - (1-3-4-6-7-8-9-10-19-48)
  - Electronic circuit, 7 criteria
    - (1-2-5-7-8-33-36)
ArtoDesign Tool, Pièce métallique, 9 critères

- 1. Do not use hazardous substances (RoHS, REACH) for Environment and Health
- 2. Limit the use of rare metals and / or high energy content and / or generating hazardous waste during processing
- 5. Reduce the mass of material and components, the surface of the electronic card and the number of weld points
- 6. Prefer the use of renewable materials or from recycling
- 7. Prefer the use of mono-materials or at least minimize the variety of materials
- 8. Minimize the number of components
- 9. Reduce the mass of material required by optimizing the mechanical strength
- 10. Reduce the mass of material required by integration of functions
- 19. Reduce the volume of packaging waste of purchased components and optimize manufacturing logistics (supplies)
Resources for the questionnaire

- The standard NF E01-005 [www.afnor.org](http://www.afnor.org)
- Artodesign Tool
- Summary table
## Summary table: 8 basic themes

1. **Choice of compact material**
   - Less toxic
   - Renewable
   - Low energy consumption
   - Recycled
   - Recyclable

2. **Reducing the use of materials**
   - Mass reduction
   - Volume reduction

3. **Use of clean production techniques**
   - Fewer production steps
   - Lower energy consumption
   - Reduced production of waste (hazardous and non-recoverable)

4. **Optimization of the distribution system**
   - Reusable packaging, cleaner, less numerous, less voluminous
   - More energy-efficient modes of transport with lower emission levels
<table>
<thead>
<tr>
<th>5. Reducing the impact of the phase of use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less energy consumption</td>
</tr>
<tr>
<td>Cleaner energy sources</td>
</tr>
<tr>
<td>Less non-renewable energy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6. Increasing the lifespan of products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durability and reliability</td>
</tr>
<tr>
<td>Facilitated maintenance and repair</td>
</tr>
<tr>
<td>Modular structure of products</td>
</tr>
<tr>
<td>Strong link product / consumer</td>
</tr>
<tr>
<td>(high esteem value)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7. Optimization of end of life treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilitated constituents disassembly</td>
</tr>
<tr>
<td>Possibility of reuse</td>
</tr>
<tr>
<td>Possibility of &quot;remanufacture&quot; or refurbishment</td>
</tr>
<tr>
<td>Recyclability of materials (facilitated by marking parts)</td>
</tr>
<tr>
<td>Cleaner incineration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8. Optimization of product features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dematerialisation product -&gt; Service</td>
</tr>
<tr>
<td>Sharing between multiple users</td>
</tr>
<tr>
<td>Integration of new functions</td>
</tr>
<tr>
<td>Functional optimization of products</td>
</tr>
</tbody>
</table>
Question

In this class, REACH is related to…

Send the most appropriate word

https://iquiz.univ-toulouse.fr/index.html
Outline

1. Recycling issues
2. Regulatory context
3. Industrial examples
4. Practical approach to eco-design
5. Research
   1. AIP-PRIMECA
   2. ECO-SD
   3. CORDIS
Research: AIP-PRIMECA network

http://www.aip-primeca.net/

Inter-Establishment Production Engineering Workshops
Computing Resource Centre for Mechanical Engineering

Skills and resources in the areas of integrated mechanical design and production engineering at the service of education, research and industry
EcoSD Network is a French association (law 1901) whose main objective is to encourage collaboration between academic and industrial researchers in order to create and spread advanced knowledge in the eco-design fields. This initiative ambition is to help a global sustainable development process on national and international levels, and beyond to recognize the French expertise in EcoSD at international.
PARE - Perspectives for the Aeronautical Research in Europe
ID: 769220

ARTEM - Aircraft noise Reduction Technologies and related Environmental Impact
ID: 769350

VIP - Véhicule Intelligent et Propre (Green and Smart Vehicle)
ID: 784865
Other resources

- Eco-conception, indicateurs, méthodes, règlementation, Philippe Schiesser, DUNOD
- http://www.lifecycleinitiative.org (europe)
Outline

1. Recycling issues
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5. Research
6. Competitive intelligence
Competitive intelligence (CI)
intelligence économique

Competitive intelligence (CI)
intelligence économique

- Competitive intelligence is the action of defining, gathering, analyzing, and distributing intelligence about products, customers, competitors, and any aspect of the environment needed to support executives and managers in strategic decision making for an organization.
Competitive intelligence (CI)

CI means:

- understanding and learning what is happening in the world outside the business to increase one's competitiveness
- learning as much as possible, as soon as possible, about one's external environment including one's industry in general and relevant competitors
Competitive intelligence (CI)

- There is a process involved in gathering information, converting it into intelligence and then using it in decision making.
INTELLIGENCE ÉCONOMIQUE

INFLUENCE
- Techniques d'influence et de contre-influence
- Lobbying
- Gestion de crise

INTELLIGENCE OFFENSIVE
- Éclairer le contexte
- Clarifier les conditions de la compétitivité

VEILLE STRATEGIQUE
- OFFRE FOURNISSEURS (prix, qualité, délais)
- EXIGENCES & ATTENTES CLIENTS
- ACTIONS & AVANÇEES CONCURRENTS

PROTECTION
- Sensibilisation personnelle (catégorisation de l'info, attitudes)
- Sécurité des locaux
- Sécurité des systèmes d'information

REGLEMENTATION TECHNOLOGIE, INNOVATION ...

FAITS & TENDANCES ÉCONOMIQUES POLITIQUES LEGALES
Quelques liens pour aller plus loin en IE

- Autre petit serious game https://www.hack-academy.fr/
- [https://www.isatech.fr/5-bonnes-raisons-pour-lentreprise-de-recourir-a-lintelligence-economique-ie/](https://www.isatech.fr/5-bonnes-raisons-pour-lentreprise-de-recourir-a-lintelligence-economique-ie/)

- Franck DECLOQUEMENT : information grise : [https://youtu.be/SXWh6PQN8wM](https://youtu.be/SXWh6PQN8wM)
- Référentiel de compétences MESR