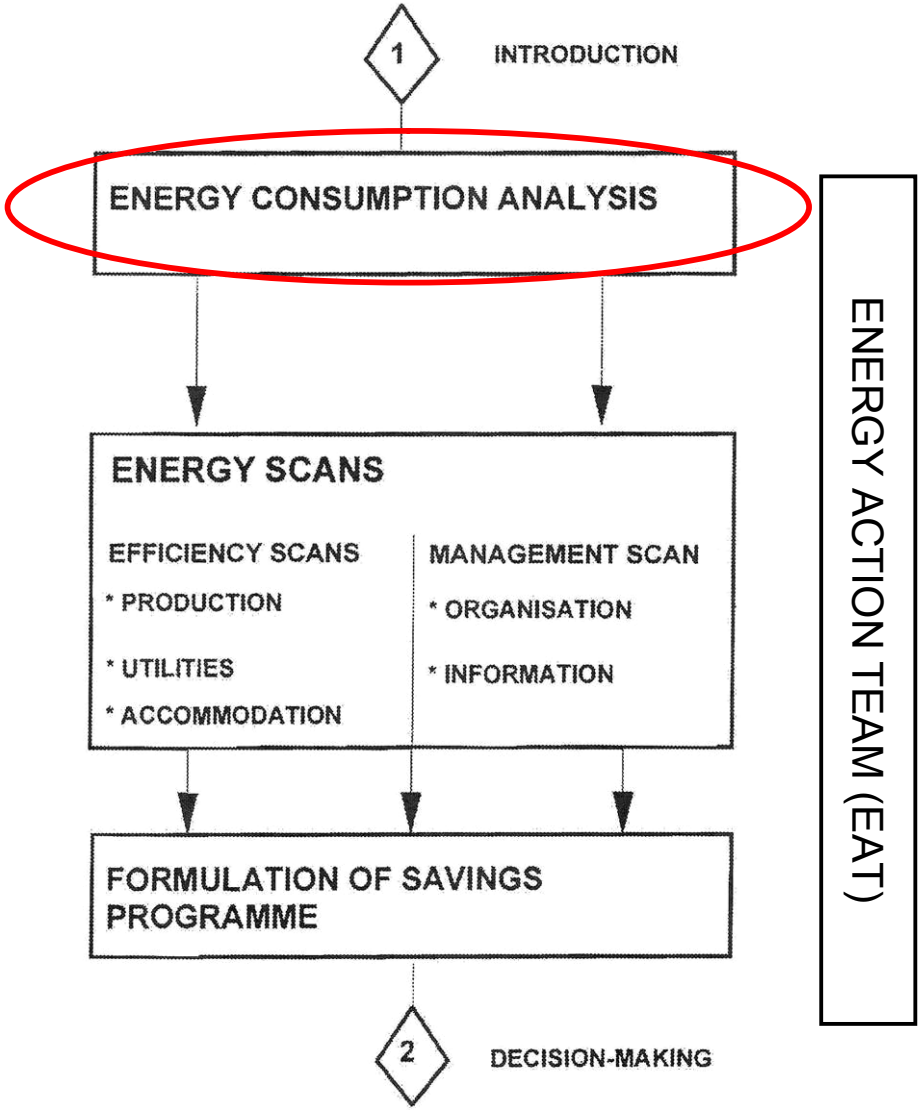

1
INTRODUCTION
ENERGY CONSUMPTION ANALYSIS
ENERGY SCANS
EFFICIENCY SCANS
* PRODUCTION
* UTILITIES
* ACCOMMODATION
MANAGEMENT SCAN
* ORGANISATION
* INFORMATION
FORMULATION OF SAVINGS PROGRAMME
2
DECISION-MAKING
ENERGY ACTION TEAM (EAT)

Energy Consumption Analysis

KICK-OFF MEETING EC&EA:

- Training / exchanging information:
  - EPS methods in general and ECA in particular;
  - Organisation of company, production processes, premises, installations and utilities
- Establishing structure of EC-data required
- Drawing up detailed timetable for ECA

Note:

1. General plant data should be collected on beforehand and are as much as possible available at kick-off meeting
2. Use (existing) spreadsheets and diagrams for collecting, processing and presenting plant data obtained in ECA

Energy Consumption Analysis

GENERAL PLANT DATA REQUIRED FOR ECA:

- Organisation of production
  - production package (tonnes/a, grades, specifications, etc.)
  - organisation diagram, number of employees in shifts / departments
  - intensity of plant usage (operational times, 3 or 5 shift system, etc.)
  - tasks of Quality&Control, Marketing&Sales, Operation, etc.
- Production
  - list of production processes, plan of plant, etc.
  - available process flow diagrams, age of installations, modifications
  - (known) major consumers of energy, industrial gases and water
- Utilities
  - purchased types of energy, steam, waste heat flows, etc.
  - internally generated industrial gases and water, cogeneration, etc.

ECA CASE

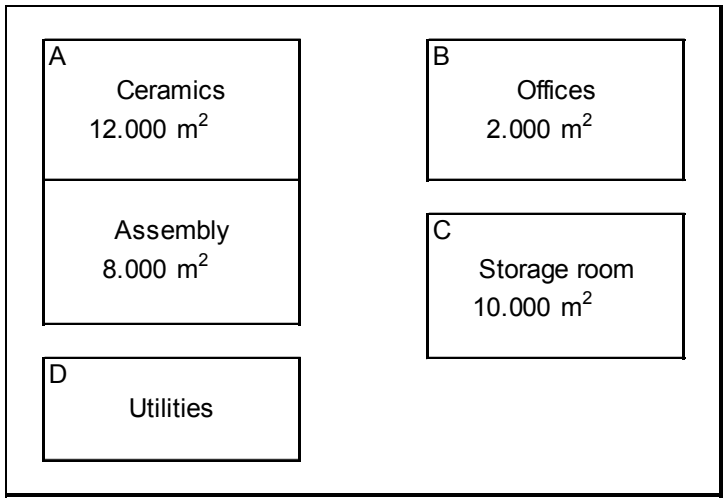
ECA step-by-step

- Inventory of the operational data
  - Factory site
  - Process steps
- Structure of the information
  - Energy networks (Electricity, Natural gas, Compressed air, …)
- Measurement of consumption
  - Utilities (e.g. compressor, pumps)
  - Accomodation (e.g. building A)
  - Production (e.g. sintering process)
- Checks
- Result (e.g. sankey diagram)

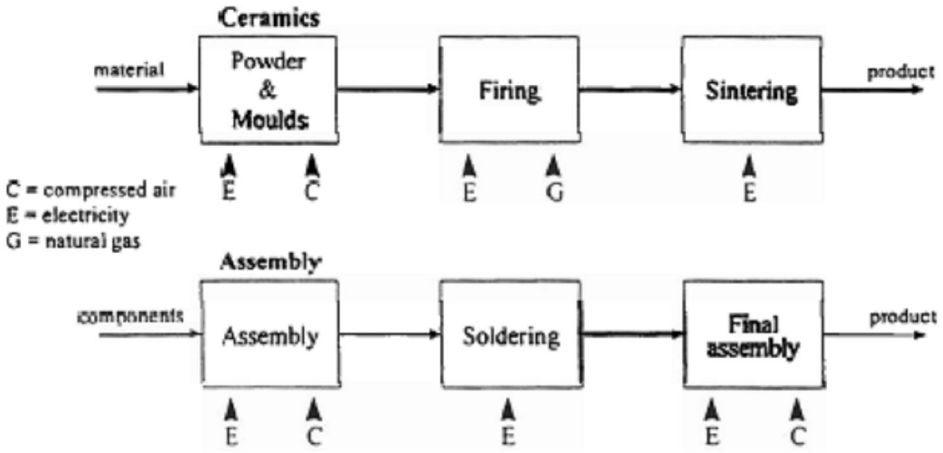
ECA CASE

Inventory of company and operational data

Factory site:



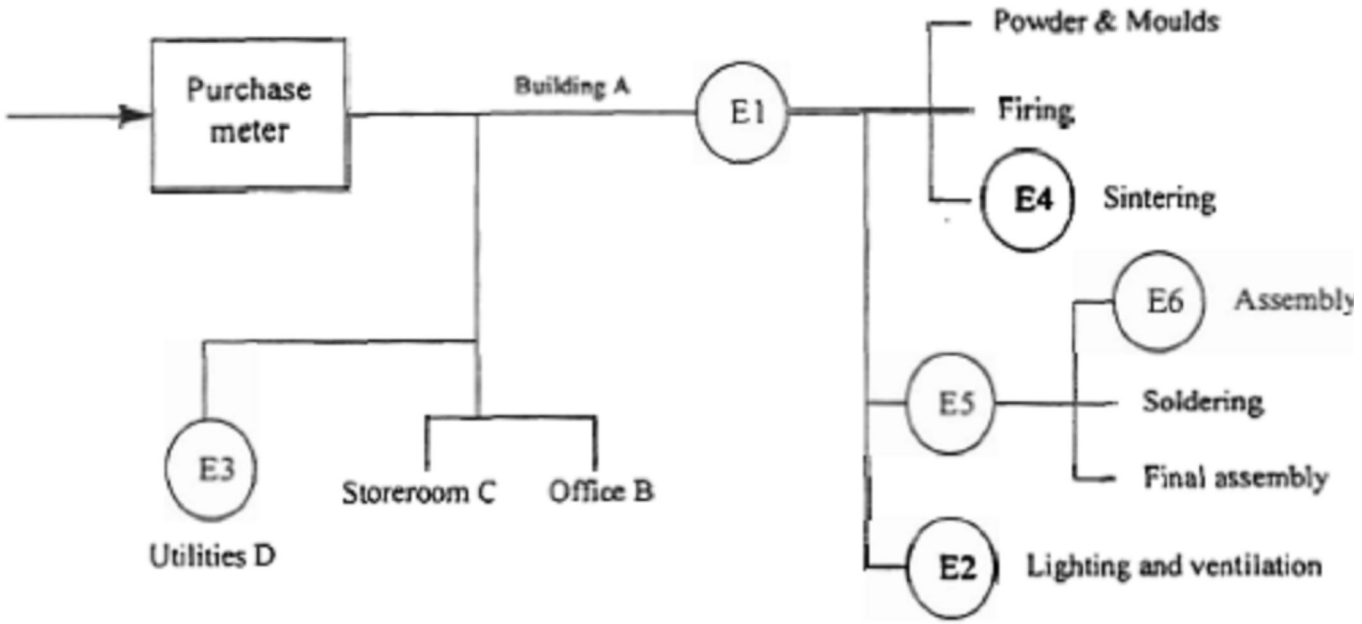
Process steps:



ECA CASE

Structure of the information

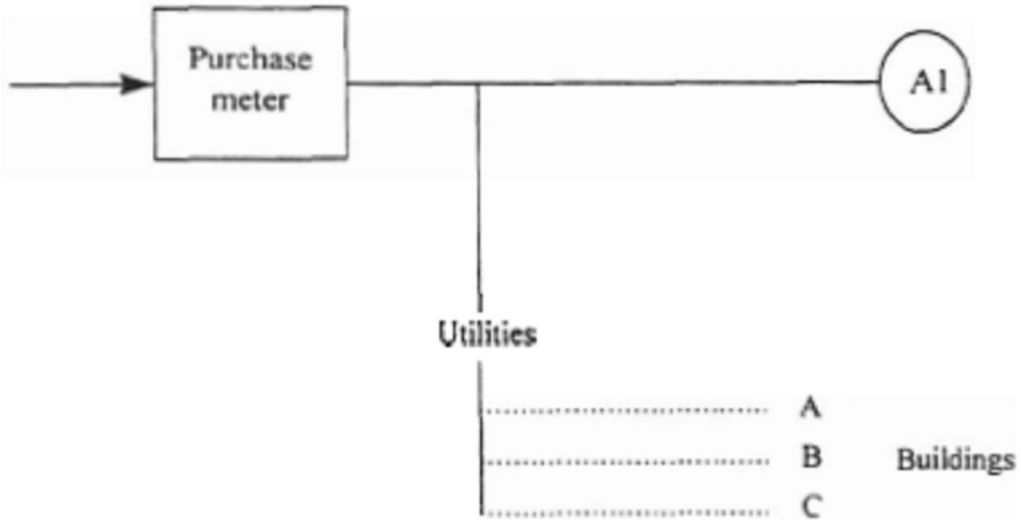
Electrical network of the factory:



ECA CASE

Structure of the information

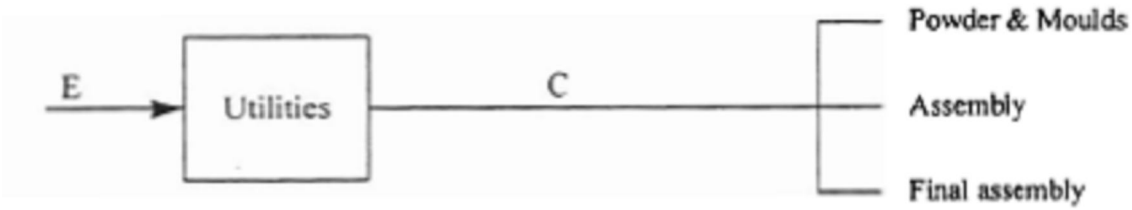
Natural gas network of the factory:



ECA CASE

Structure of the information

Compressed air network of the factory:



ECA CASE

Energy consumption data

Energy data from invoices and meters:

Electricity	**MWh**
Main meter (purchase)	7730
E1	6260
E2	1320
E3	910
E4	4100
E5	450
E6	120

Natural gas	1000 m^3
Main meter (purchase)	1410
A1 (firing)	620

Energy balance: Utilities

Estimating is allowed !

Utilities	Unit	Compressor		Pumps		Effective heat		Heat loss		Total
		MWh	GJ(p)	MWh	GJ(p)	1000 m3	GJ(p)	1000 m3	GJ(p)	GJ(p)
Electricity	MWh	878	7.902	32	288					
Natural gas	1000 m3					514	16.252	277	8.751	
Total primary energy	GJ(p)		7.902		288		16.252		8.751	33.194

ECA CASE

Energy balance: Buildings

Building A	Unit	Heating		Lighting		Ventilation		Total
		1000 m3	GJ(p)	MWh	GJ(p)	MWh	GJ(p)	GJ(p)
Electricity	MWh			690	6.210	630	5.670	
Natural gas	1000 m3	494	15.627					
Total primary energy	GJ(p)		15.627		6.210		5.670	27.507

Building B	Unit	Heating		Lighting		Office equipment		Total
		1000 m3	GJ(p)	MWh	GJ(p)	MWh	GJ(p)	GJ(p)
Electricity	MWh			60	540	120	1.080	
Natural gas	1000 m3	49	1.563					
Total primary energy	GJ(p)		1.563		540		1.080	3.183

Building C	Unit	Heating		Lighting		Total
		1000 m3	GJ(p)	MWh	GJ(p)	GJ(p)
Electricity	MWh			380	3.420	
Natural gas	1000 m3	247	7.814			
Total primary energy	GJ(p)		7.814		3.420	11.234

ECA CASE

Energy balance: Production

Ceramics	Unit	Powder & Moulds		Firing		Sintering		Total
			GJ(p)		GJ(p)		GJ(p)	GJ(p)
Electricity	MWh	340	3.060	50	450	4.100	36.900	40.410
Natural gas	1000 m3			620	19.623			19.623
Compressed air	MWh	615	5.531					5.531
Total primary energy	GJ(p)		8.591		20.073		36.900	65.564

Assembly	Unit	Assembly	
			GJ(p)
Electricity	MWh	450	4.050
Natural gas	1000 m3		
Compressed air	MWh	263	2.371
Total primary energy	GJ(p)		6.421

ECA CASE

Checks

Department	Allocated to end users		
	Electricity	Natural gas	Compressed air
	(MWh)	(1000 m3)	(MWh)
Powder & Moulds	340	0	615
Firing	50	620	0
Sintering	4.100	0	0
Assembly	450	0	263
Utilities	32 (only includes pumps which have not been allocated yet)	(allocated to Accommodation)	(allocated to Production)
Building A	1.320	494	0
Building B	180	49	0
Building C	380	247	0
Total	**6.852**	**1.410**	**878**

	Allocated	Purchased	Difference
Electricity (MWh)	7.730	7.730	0,0%
Natural gas (*1000 m3)	1.410	1410	0,0%