ترشيد استهلاك الطاقة
نحو اقتصاد أفضل و بيئة آمنة

الملخص

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105

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(Sustainable   Development)

(GDP)

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(GHE)

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(1992)

(UNDP)

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.[3] 1997   "   :

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(   )

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(…

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% 76   (fossil fuel)

.[3]

107

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.[4]

(primary commercial fuels)

1996   8380

% 12,7   ." 9600
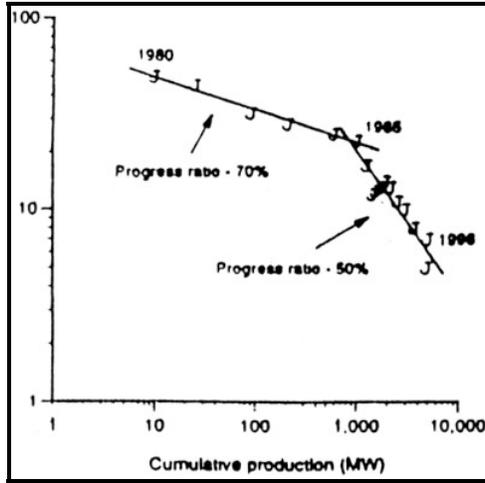
(...   )   .(1)

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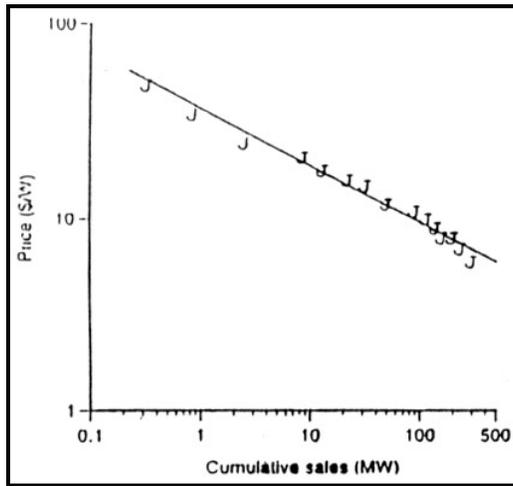
.1

J. Goldemberg "Leapfrog Energy Technologies", Nov. 97. :

5000 – 3000

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(% 5)   .

(   )   .

. 2100 – 1990   10

1.9   )

(2.5

.[3]   2100

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(GHE)

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110

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% 1 (... PV)

(1–)1996

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(Supply :

. (Demand Side) Side)

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70 60

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111

%

(4 -   )

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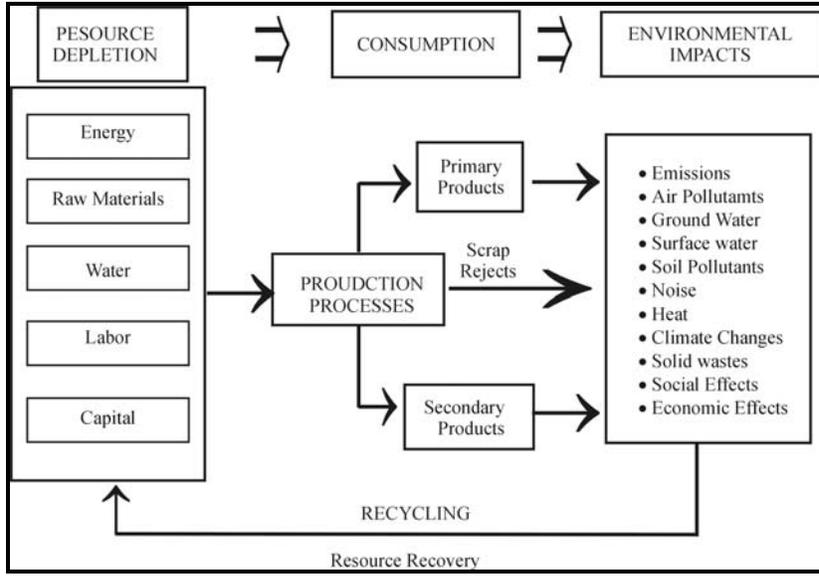–   (3)

.[5]

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Fig. 3. Environmental Presentation of an Industrial Process

:   **1– 4**

.[3]   % 45

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(2)   .
.[6]

113

2.

*

(%)		
** 15-10	–	
40-25	–	
:		
50	–	
70	–	
30-20	–	
30-10	–	–
50	–	–
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30

50 % 60   % 50

(   ) .

114

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(3)   .

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% 12- % 5		
%60		.
% 20		* *
% 20 -% 10		( )
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% 20 - % 15		

115

		– / – –
% 15 – 10		
% 5 .	.	.
%10 % 2		
% 20		
. % 40 :% 25		* * *

.(4 -   )

EKONO- ENERGY

:
% 46 – 28	▪
% 58	▪
% 88 – 65	▪
% 45 – 22	▪
% 21	▪

■ 35 %

■ 61 %

(4).

3 – 4 :

[1997 7 20 %

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4.

*

%	/	/	/	
40	380	950	570	
34	67	( ) 200	( ) 133	
28	468	1654	1186	
40	403	1000	597	
35	220	620	400	
38	57	152	95	
24	545	2270	1725	
52	99	192	93	
46	457	1000	543	

–

53	577	1100	523	

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90   95 %

60   70 %   30   55

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(5)

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Table 5. The cost of electrical power in industry is particularly favorable if the steam used in generating the power is also used in the industrial process, or is generated by waste heat or combustible waste materials produced by the process.

119

Branch of Industry	Processes with		
	heat demand	waste heat	combustible waste
Chemicals			
• Petrochemical products	☽		
• Fertilizers		◯	
• General chemical products	☾		
Fibrous materials			
• Pulp, paper	☽		☽
• Textiles	☽		
Foodstuffs			
• Sugarbeet, sugarcane	☽		☽
• Milk products	☽		
• Beer	☽		
Building materials			
• Wood products	☽		☽
• Cement		☾	
Metals			
• Aluminum (bauxite)	☽		
• Ferrous metal, other metals		☾	☾
Primary use of			
☽ backpressure turbines	◯ condensing turbines		

Burg Kirchen

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. [8]

220.000

.(4   )   740.000

10   .

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% 60   /   0.5

)

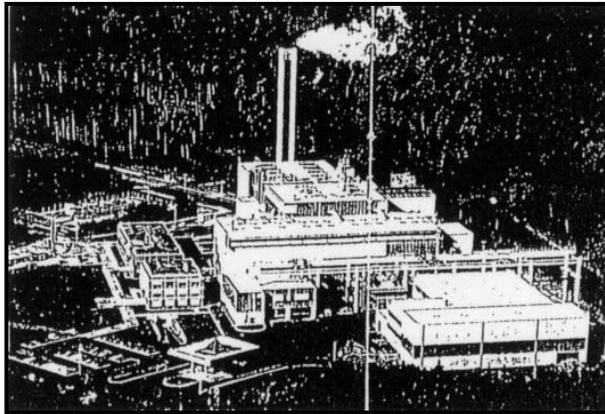Burg Kirchen   ([7]

% 12

. 1996

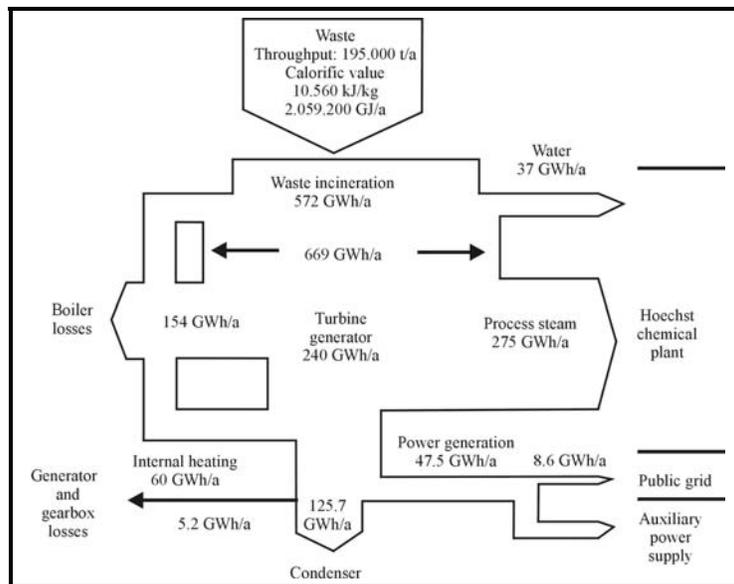.(:   ) ..

121

Fig. 4.   Diagram of the flows of energy in the waste – fired cogeneration plant: the plant utilizes up to 75% of the energy content of the waste, since the steam produced by the plant in utilized in the chemical process and in the steam turbine.

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(WEC)

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30 – 20)

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(Energy -Environment models)   –

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- (Cost – Efficient)   -

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EFOM-ENV – (Energy Flow Optimization – Model Environmental Module)

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PERSEUS (Program Package for Emission Reduction in Energy Use and Supply)

IIP

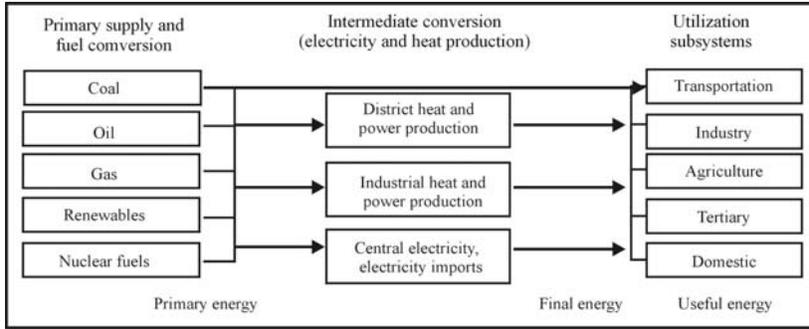.   Karlsruhe   (Institute for Industrial Production)

▪   **EFOM – ENV**:

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.(5)

123

Fig. 5. Model Structure of EFOM – ENV

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EFOM-ENV

.   (30– 20)

▪   **PERSEUS**:

PERSEUS   EU – EFOM – ENV

(Model / Module)

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▪   **PERSEUS**   **EFOM– ENV**:

(7)

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Table 6. PERSEUS: Characteristics of models and modules

Model / Module	Characteristics	Applications
Traditional EFOM – ENV	Linear optimization, national approach, all kinds of emission reduction measures, quasi – dynamic programming	EU, Russia, Poland, Czech + Slovak Rep., Hungary, Ukraine,…
Fuzzy Model	Use of fuzzy sets	Lithuania
Partial Equilibrium Model	Price elasticities to represent changes in energy demand caused by prices.	Germany
Global Warming Model	Also non – energy activities, all GHGs, two methods for evaluation of damage	Germany, Russsia, Indonesia, Columbia
Mixed Integer Model	Mixed integer programming, option to analyse additional issues (location planning, regional environm. Aspects…)	Slovenia
LCP/ IRP Model	Detailed load curves, energy delivery contracts, investment constraints	3 German energy utilities

Table 7. Possible EFOM – ENV/ PERSEUS Applications

Possible Model Applications and Results	Usability as support for		
	International discussions	National energy policy	Energy supply companies
Energy Supply Planning / Optimization		In centralized systems only	Very good
Emission reduction Strategies		Very good	Good
Calculation of costs to meet emission reduction ceilings or emission limits	Very good	Very good	Good
Assessment of impacts of new legislation	Very good	Very good	Very good
Evaluation of new concepts (e.g. JI, LCP) Assessment of potentials. Assessment of specific projects	Very good	Very good Very good	Very good

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