New Approaches to Power Objects Working Modes Optimization with Fuzzy Sets Theory Methods Using

MULTICRITERIA OPTIMIZATION OF POWER OBJECTS WORKING MODES WITH FUZZY APPROACH USING

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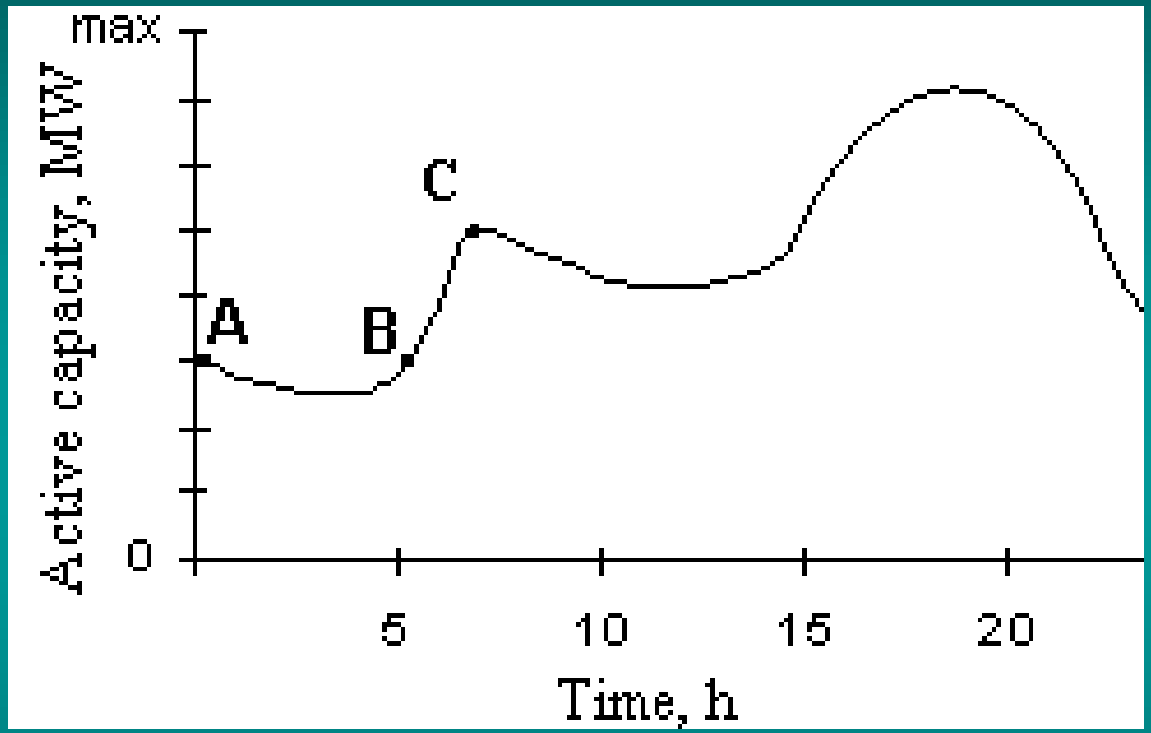
$$F = f(F_{\text{econ.}}, F_{\text{rel.}}, F_{\text{ecol.}}, F_{\text{man.}})_{opt.}$$



The optimization problem is:

by set summary power station load to define loads for working in parallel its aggregates (subsystems), which give:

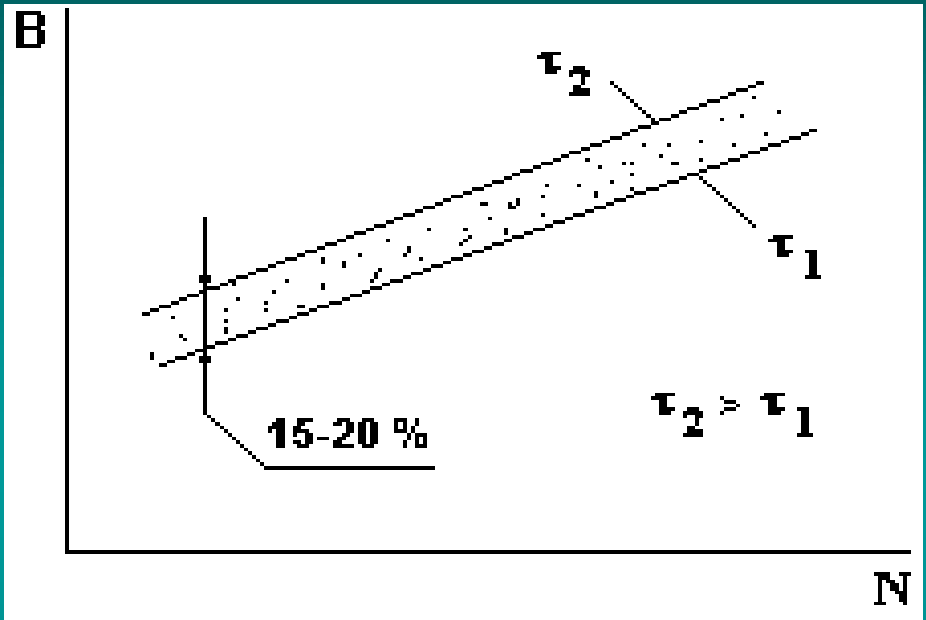
- *minimum general expenditures* for production of energy (heat and/or electrical)
- *by maximum level of equipment working reliability,*
- *maximum reduction* of harmful pollution into environment and
- *sufficient level of equipment manoeuvrability.*

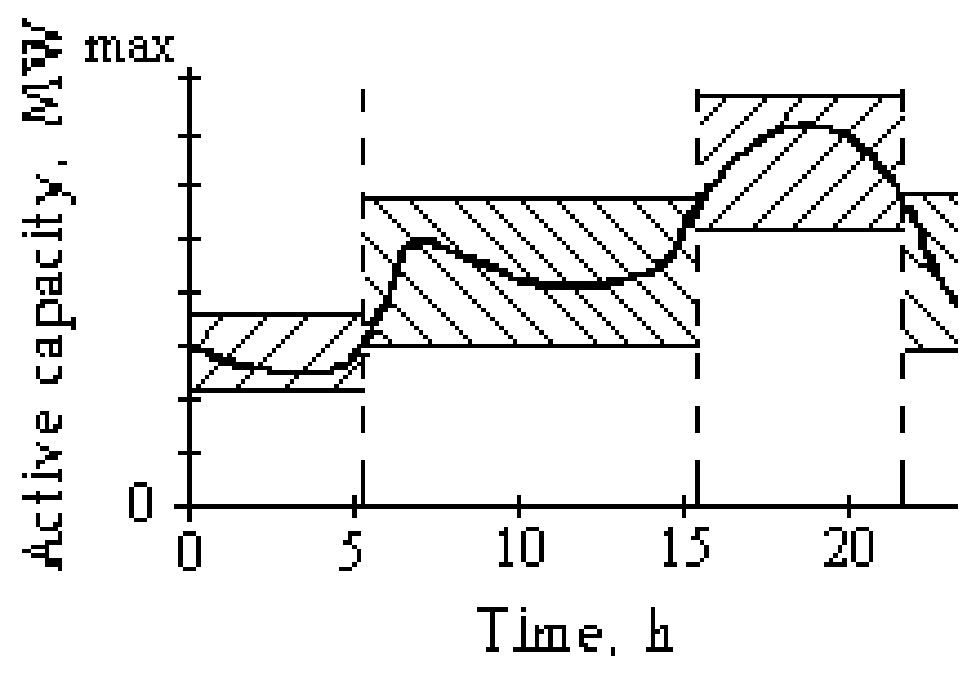
For solving this problem for today there are three using more often approaches:

general optimized function is defined as mentioned above criteria weighted sum: $F = \sum(k_i \cdot F_i)_{opt}$

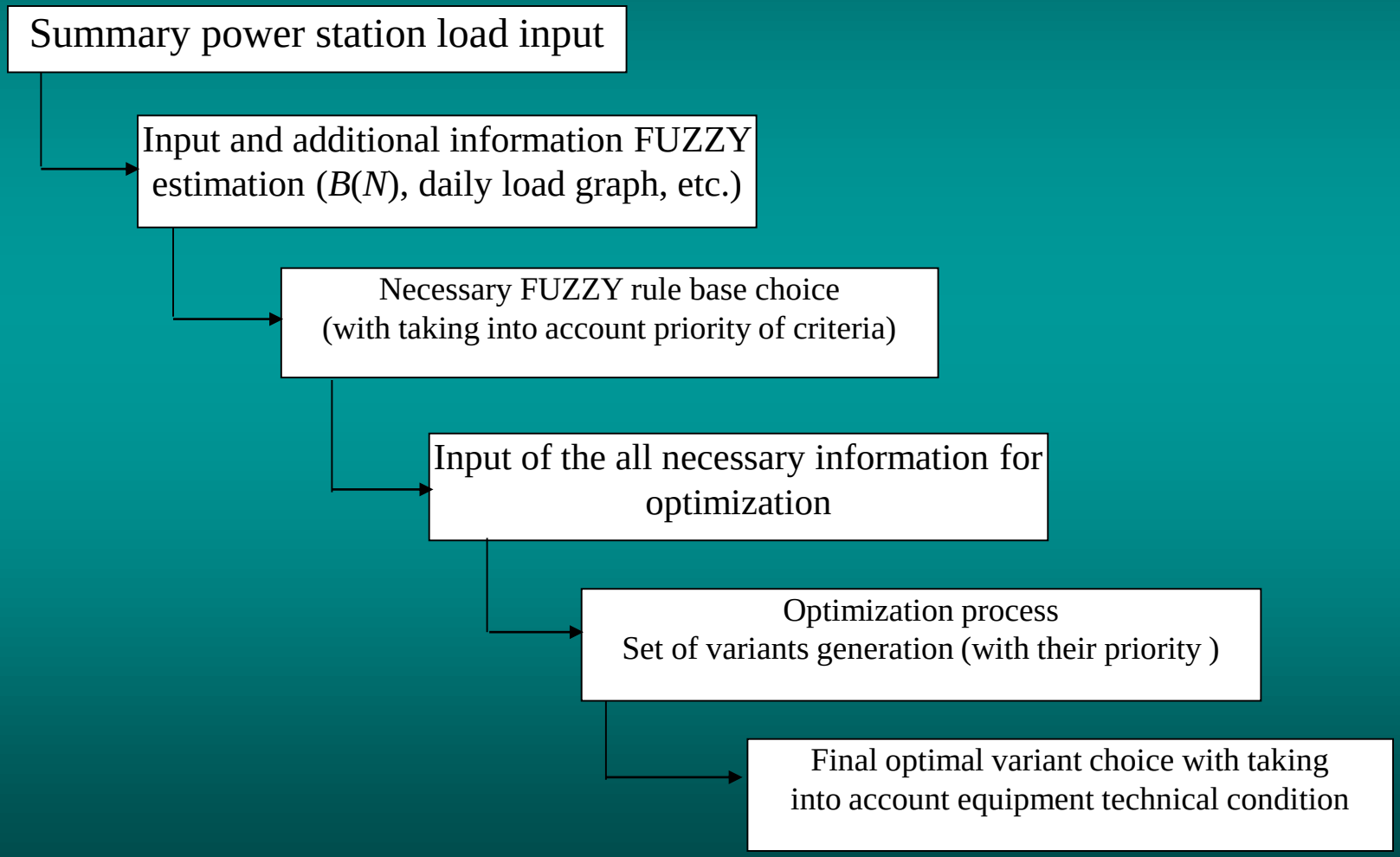
detaching of the so-called 'main' criterion, by which, immediately, optimization is carried out. Another criteria are taken into account as the limitations.

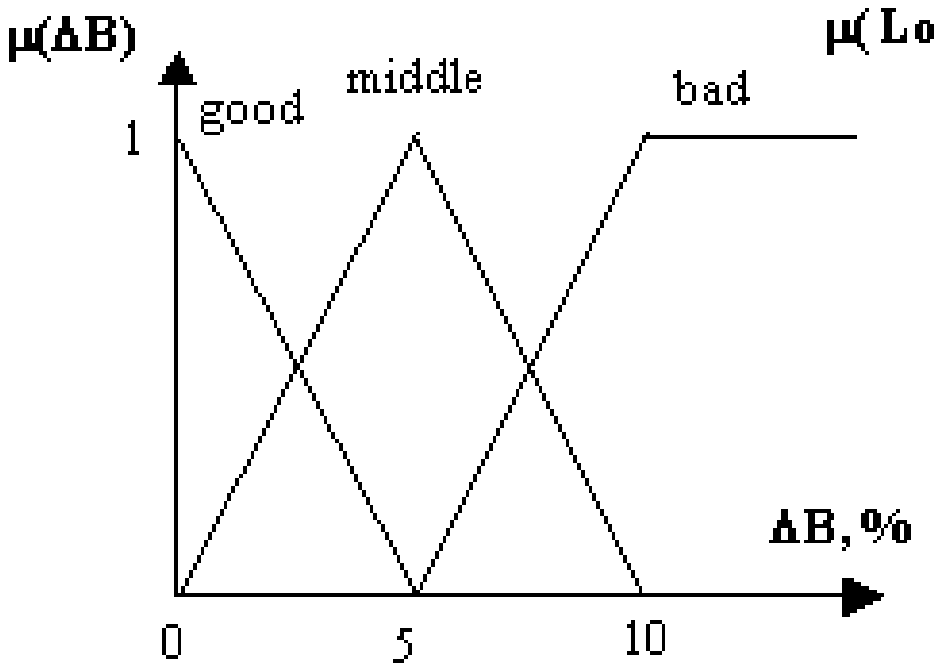
all criteria are taken into account not simultaneously, but consecutively


B
τ2
τ1
15-20 %
τ2 > τ1
N

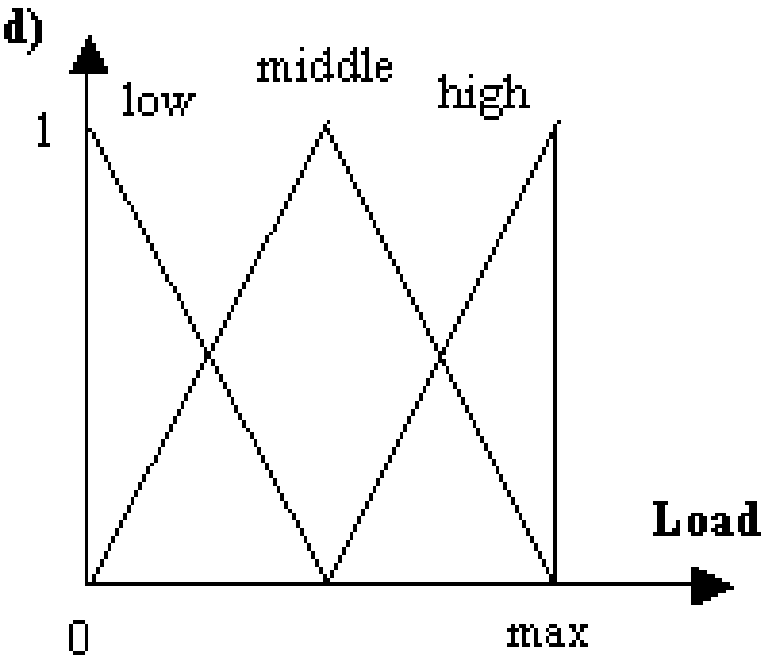

max
Active capacity, MW
0
0
5
10
15
20
Time, h

Generalized scheme of load distribution optimization execution

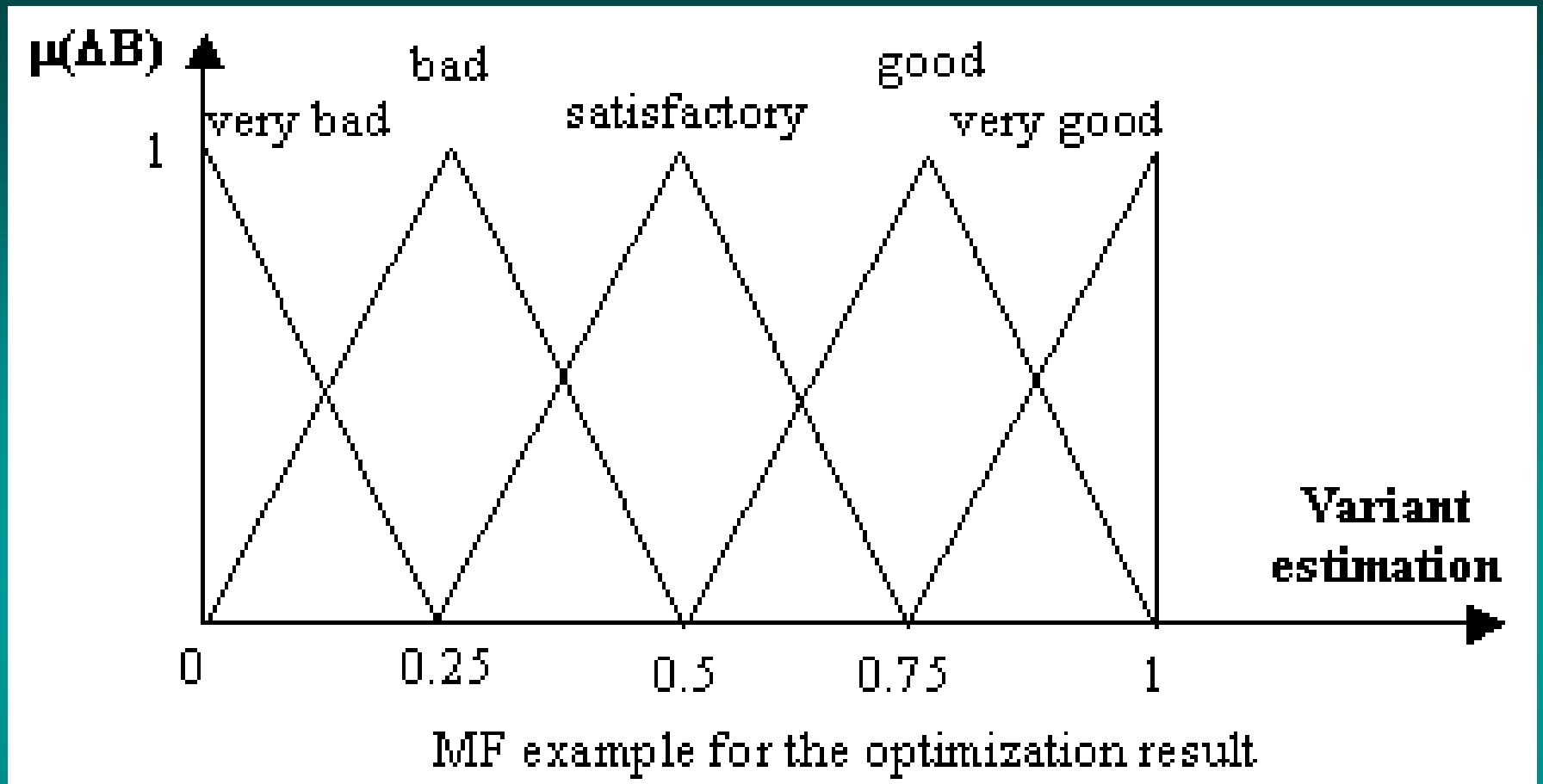




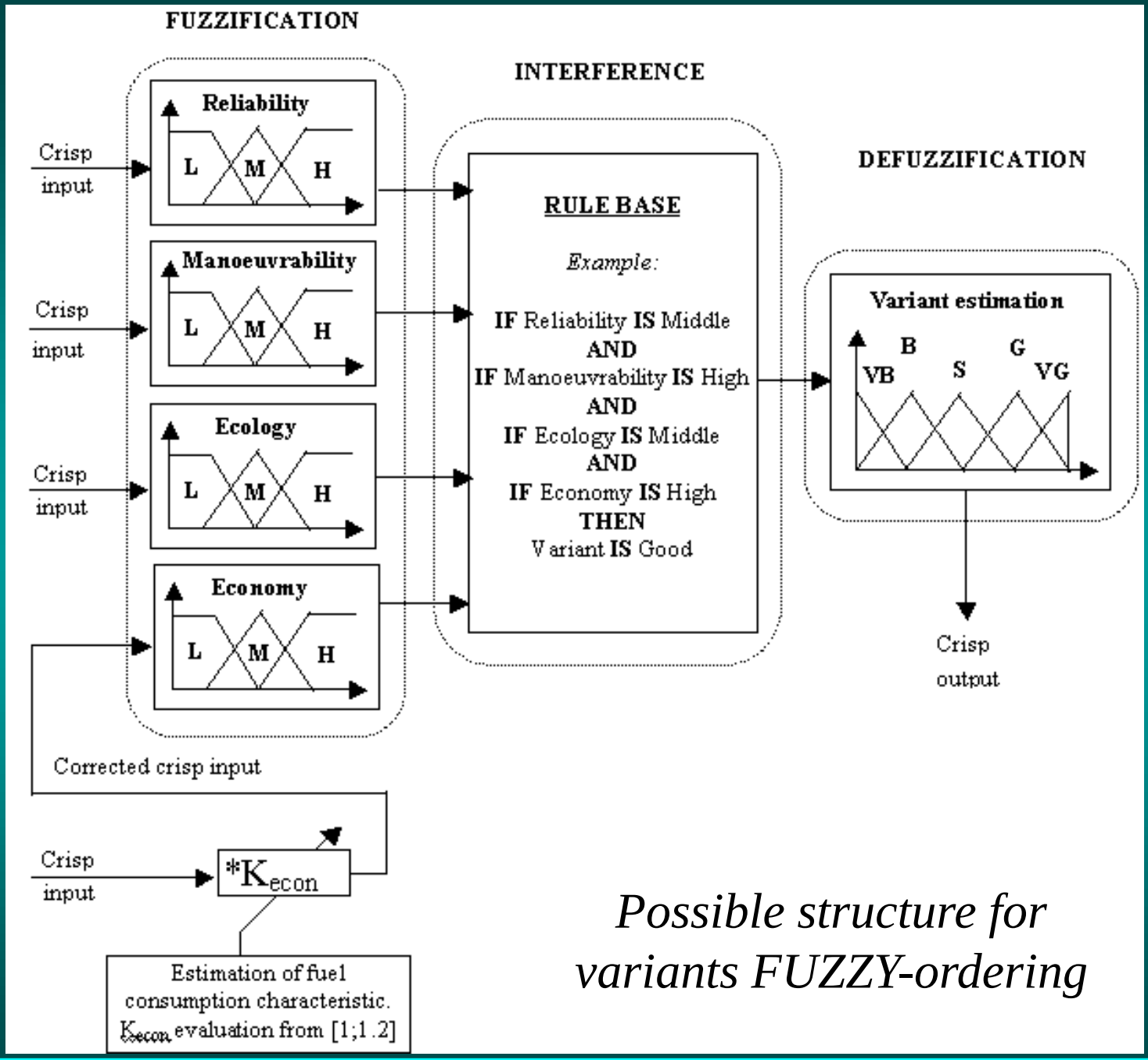
MF example for the fuel consumption characteristics



MF example for the daily load graphs

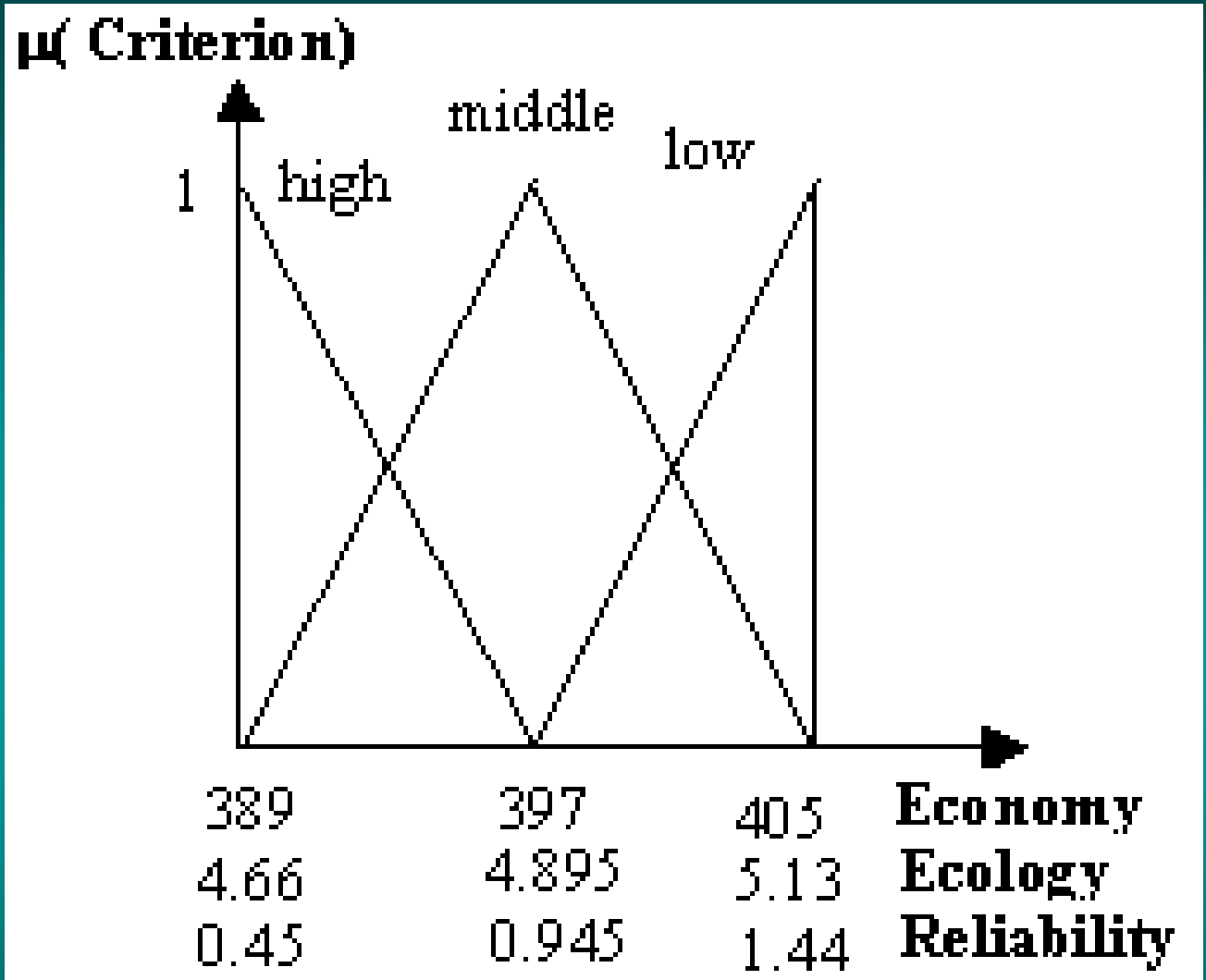


MF example for the optimization result



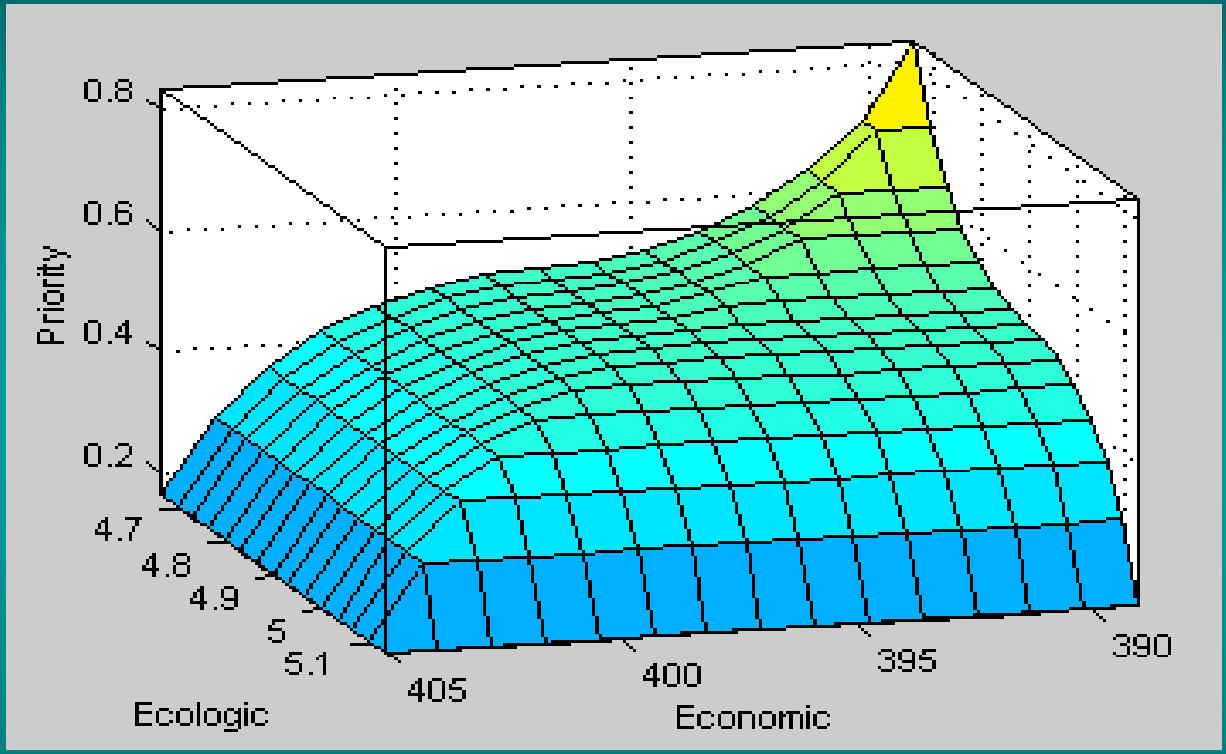
Possible structure for variants FUZZY-ordering

Var. №	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Block 1, MW	300	300	300	240	300	300	300	270	270	270	285	300	280	280	280
Block 2, MW	300	300	240	300	300	270	270	300	270	300	285	280	300	280	280
Block 3, MW	300	240	300	300	270	300	270	300	300	270	285	280	280	300	280
Block 4, MW	240	300	300	300	270	270	300	270	300	300	285	280	280	280	300



MF for all criteria.

Output surface for priorities



Var. №	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Priority	0.163	0.094	0.472	0.204	0.401	0.362	0.577	0.330	0.496	0.406	0.455	0.487	0.519	0.52	0.39
Place	14	15	6	13	9	11	1	12	4	8	7	5	3	2	10

REFERENCES

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