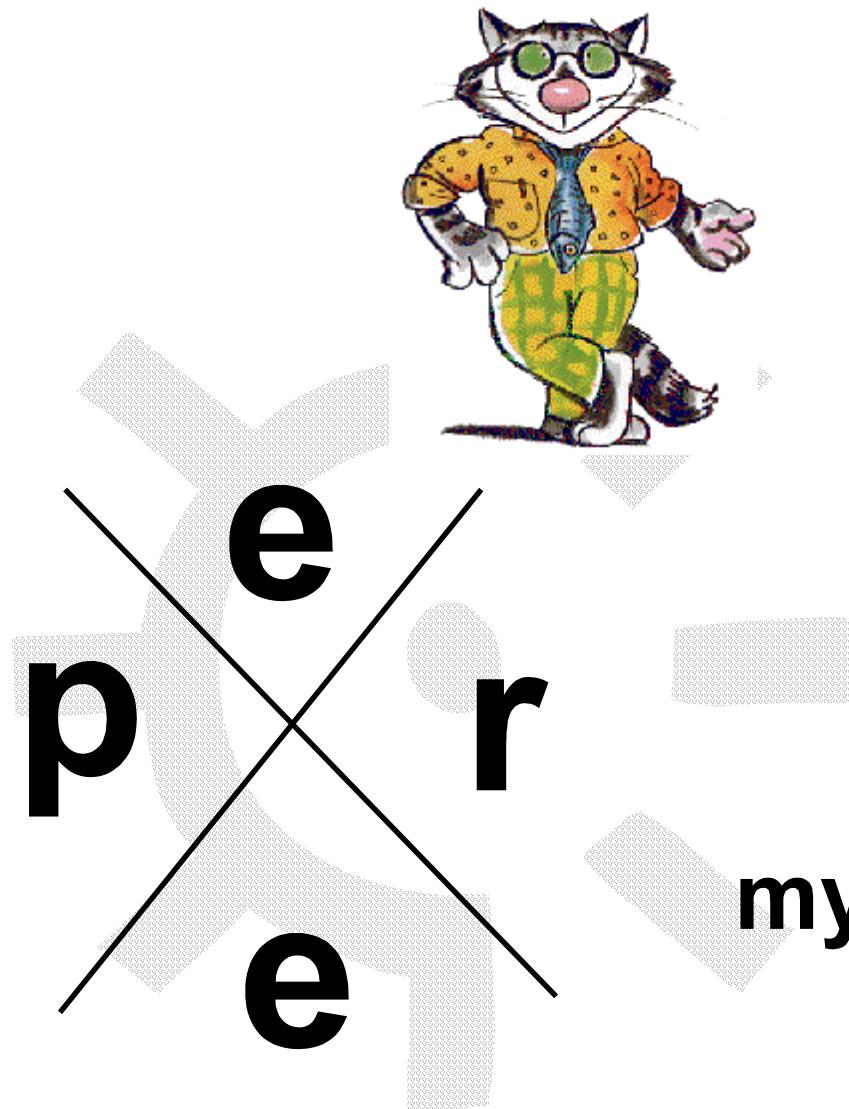




Applications of Quasitopos Axioms in Optimization





**H²' 60th,
my top cat friend**



H² category theory

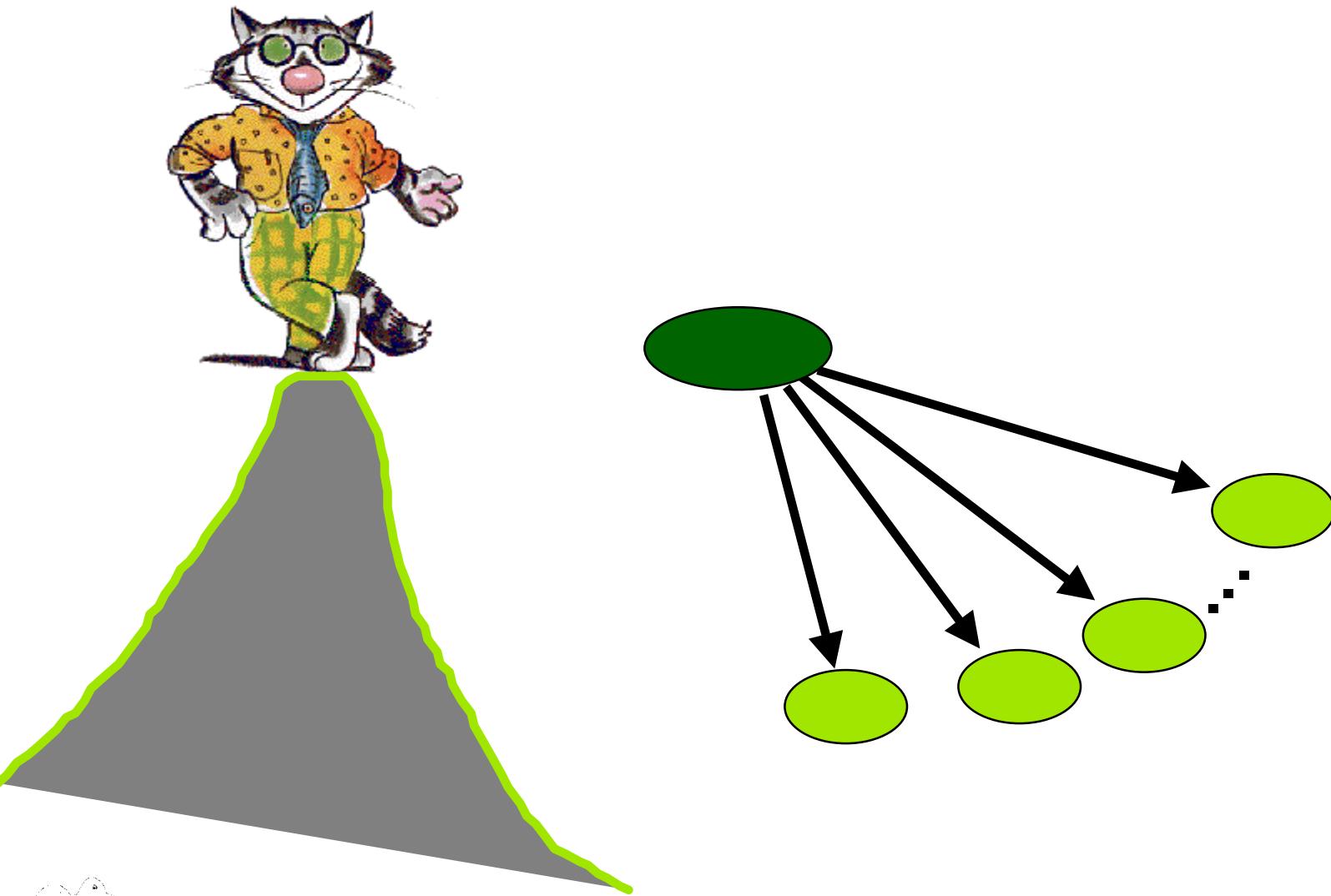
- ❖ topological categories
- ❖ quasitopoi

H² applications / optimization

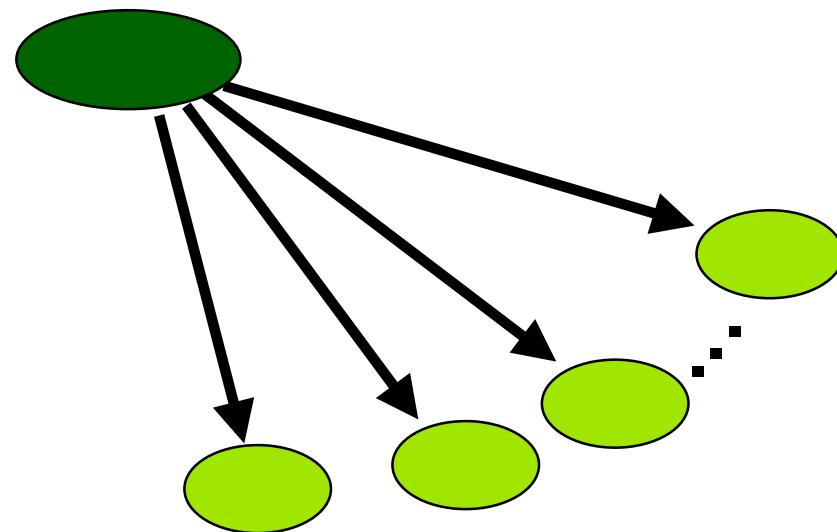
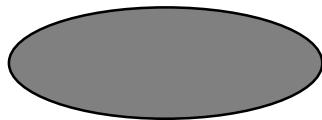
- ❖ load balancing
- ❖ bin packing
- ❖ demand/supply balancing
- ❖ forecasting



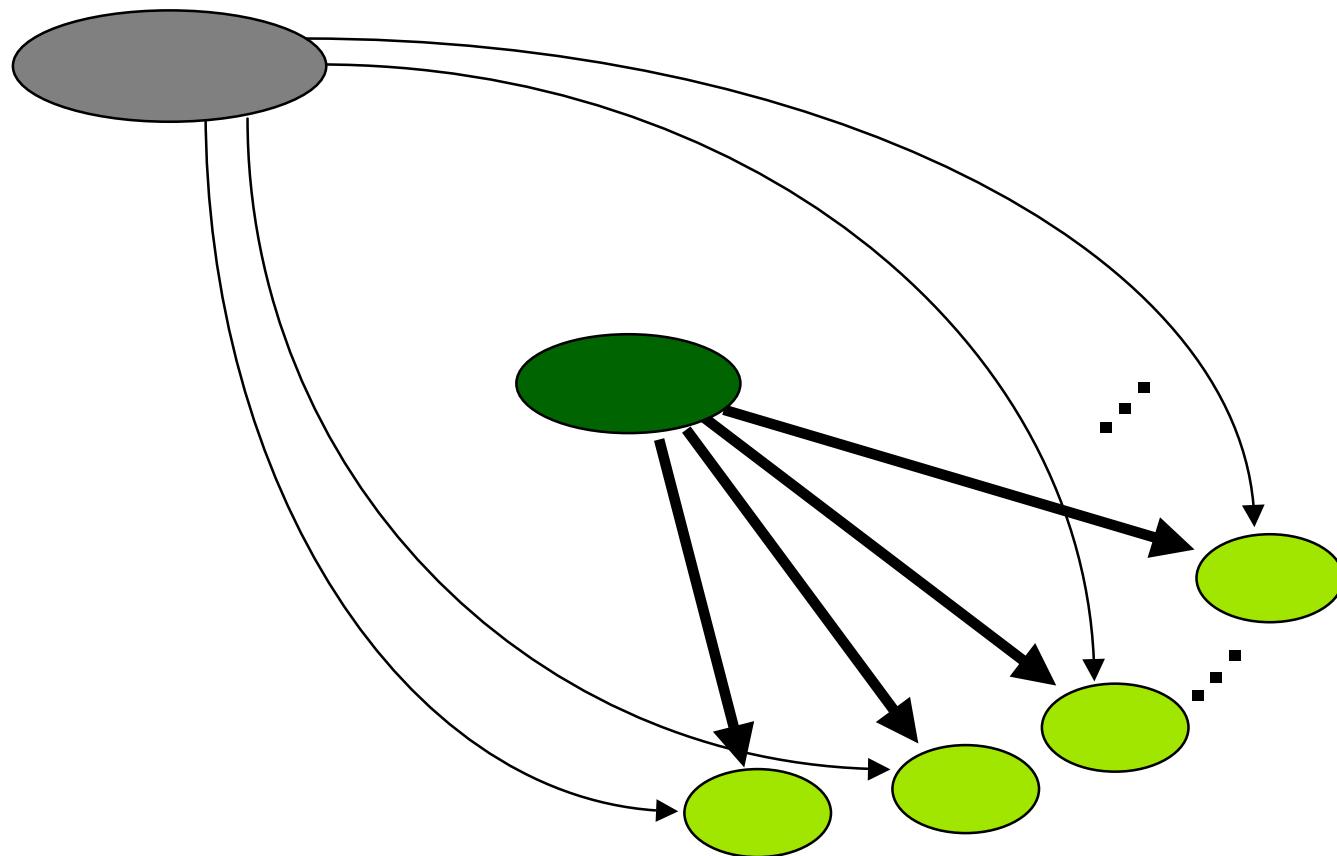
top cats: initial structures



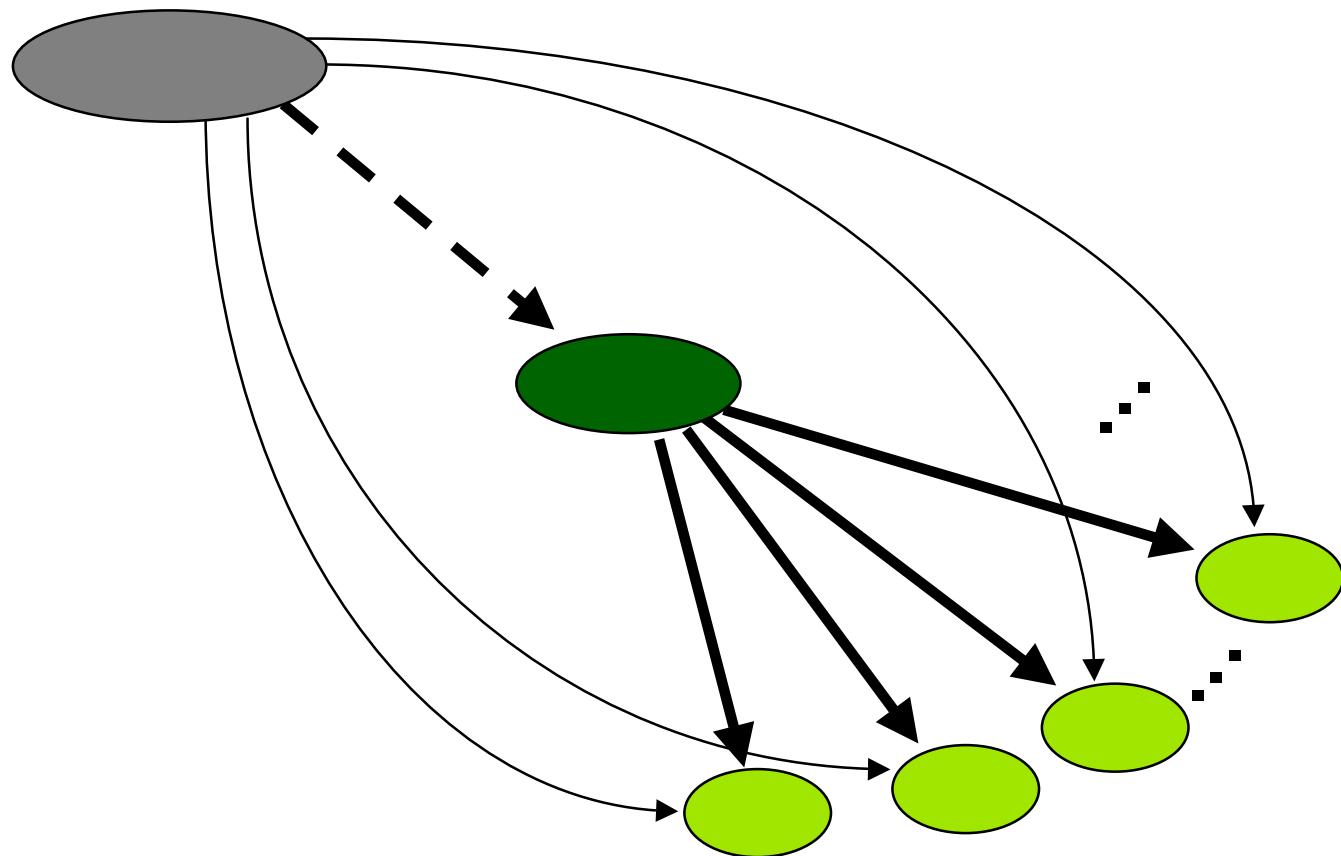
top cats: initial structures



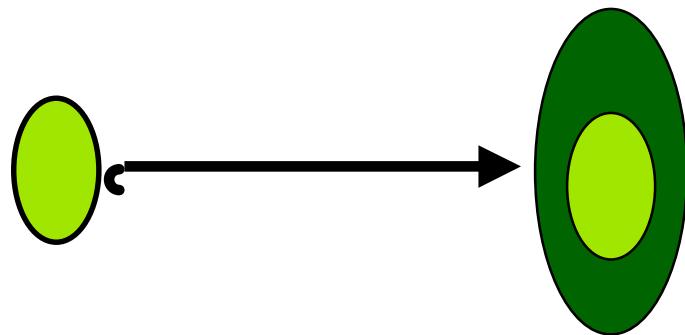
top cats: initial structures



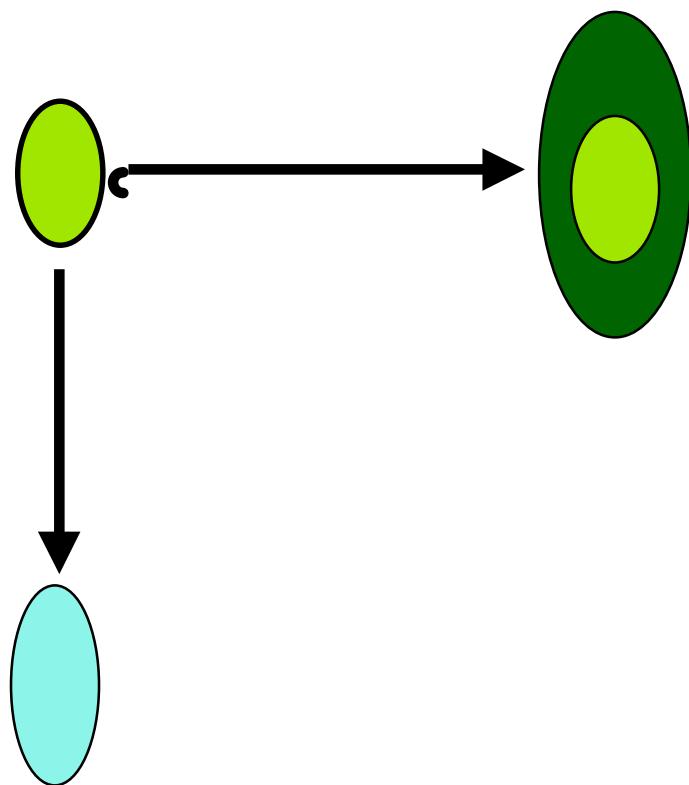
top cats: initial structures



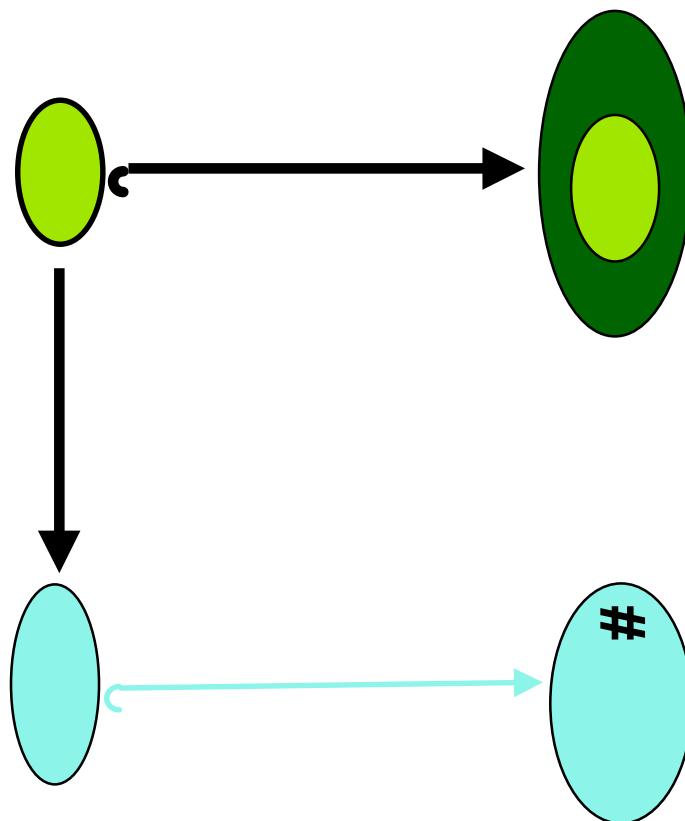
quasitopoi: partial morphisms



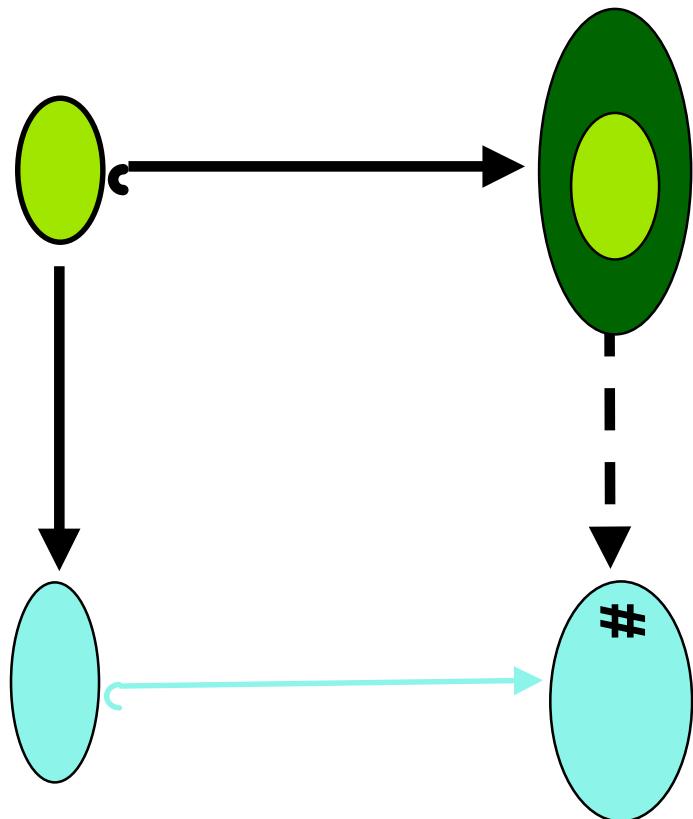
quasitopoi: partial morphisms



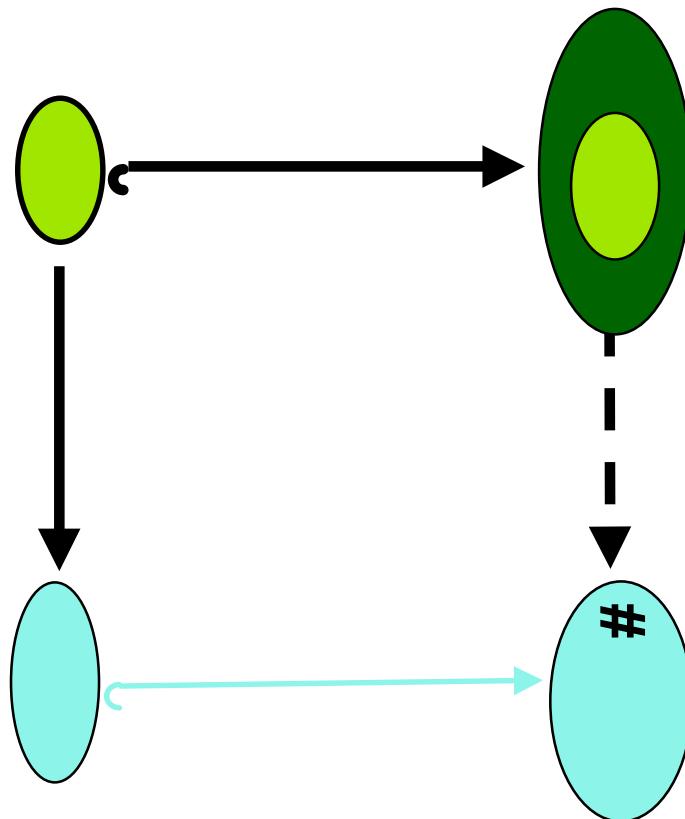
quasitopoi: partial morphisms



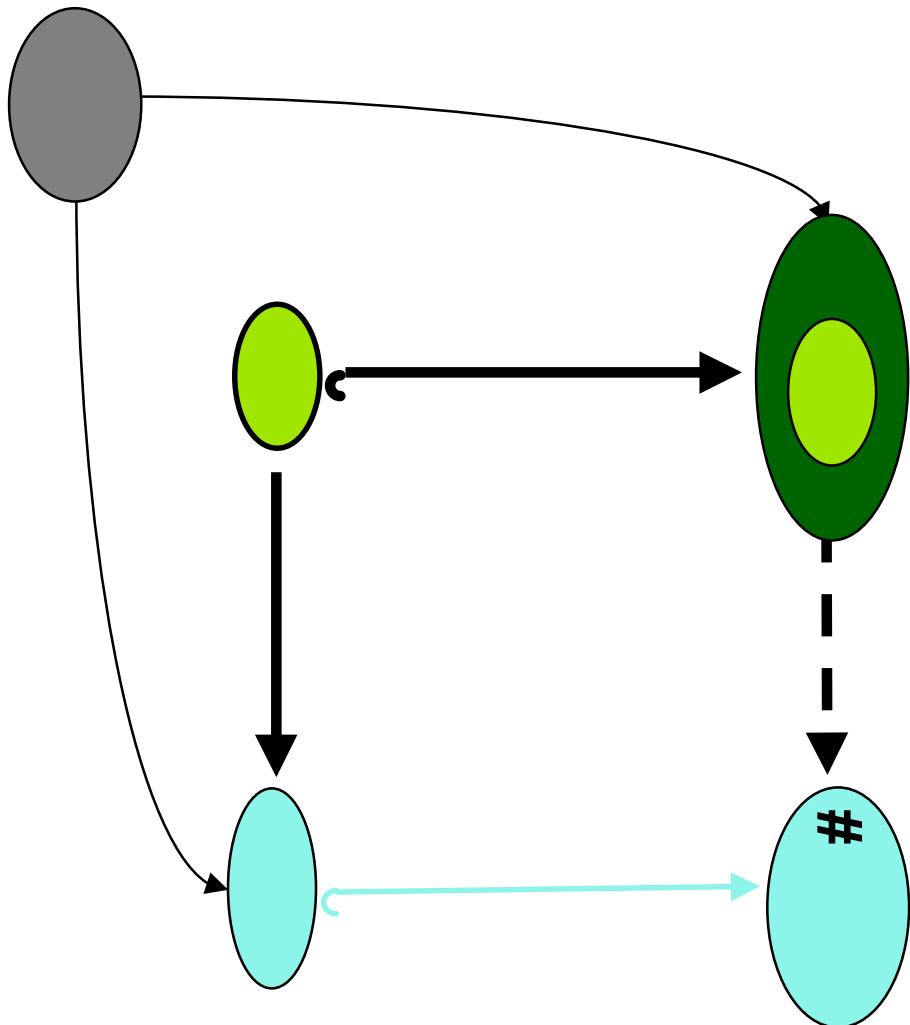
quasitopoi: partial morphisms



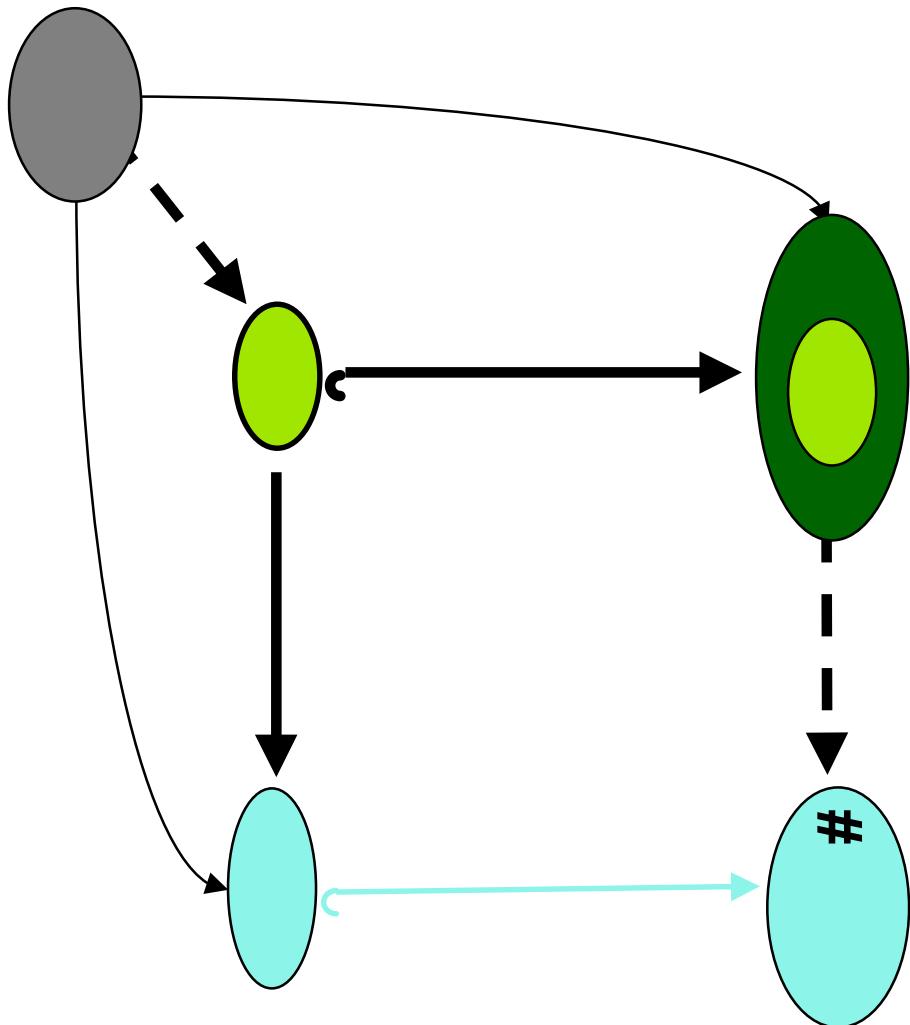
quasitopoi: partial morphisms



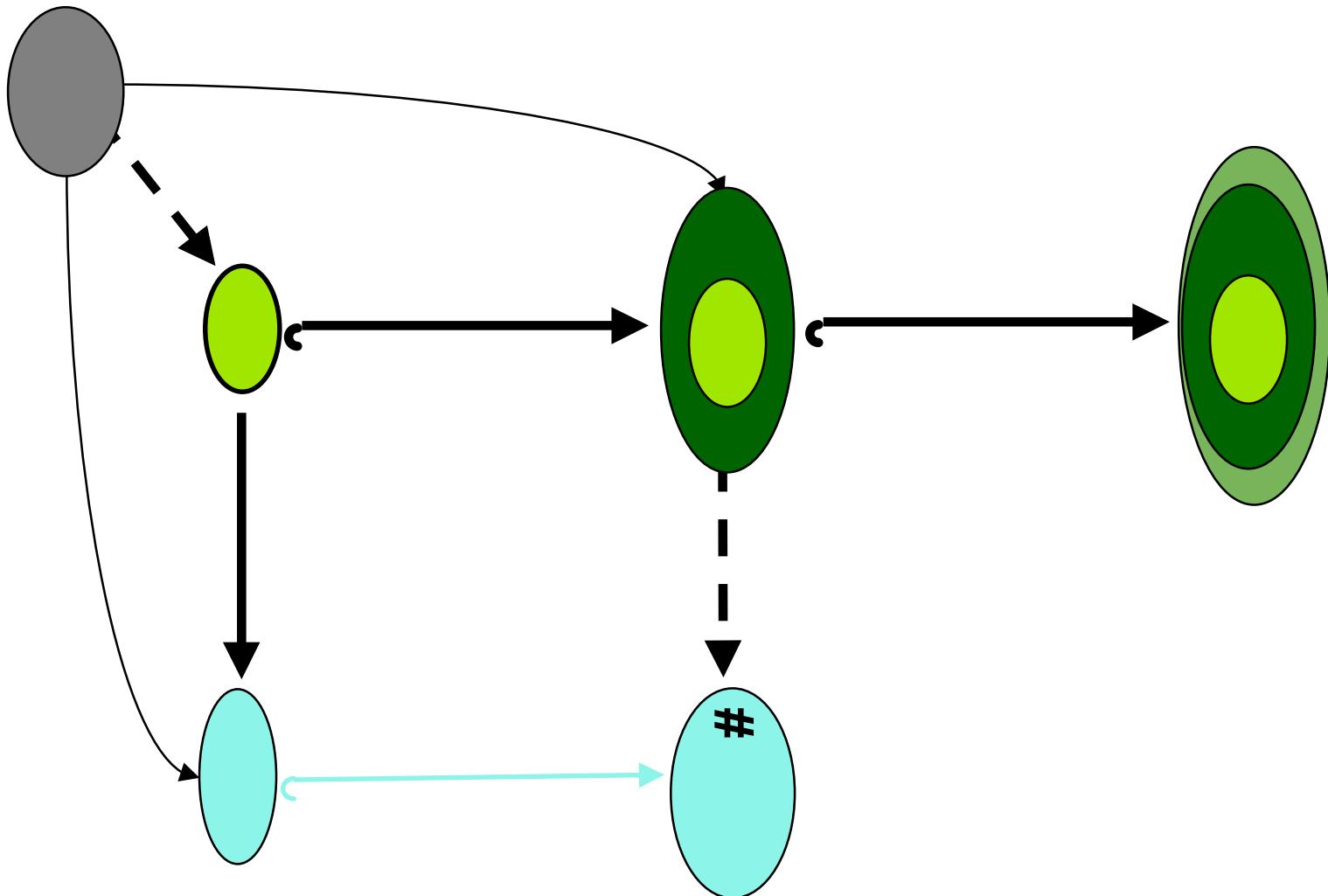
quasitopoi: partial morphisms



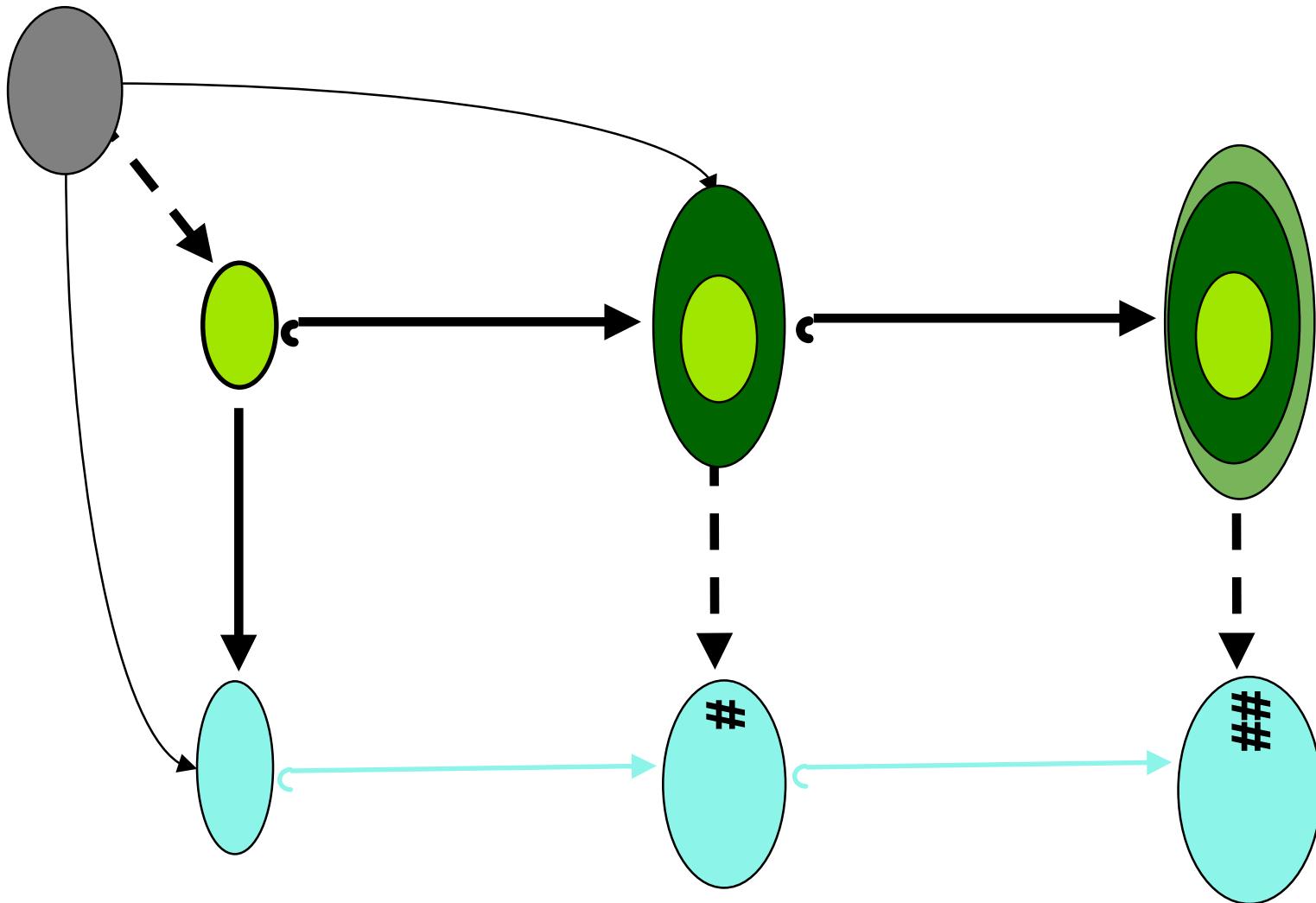
quasitopoi: partial morphisms



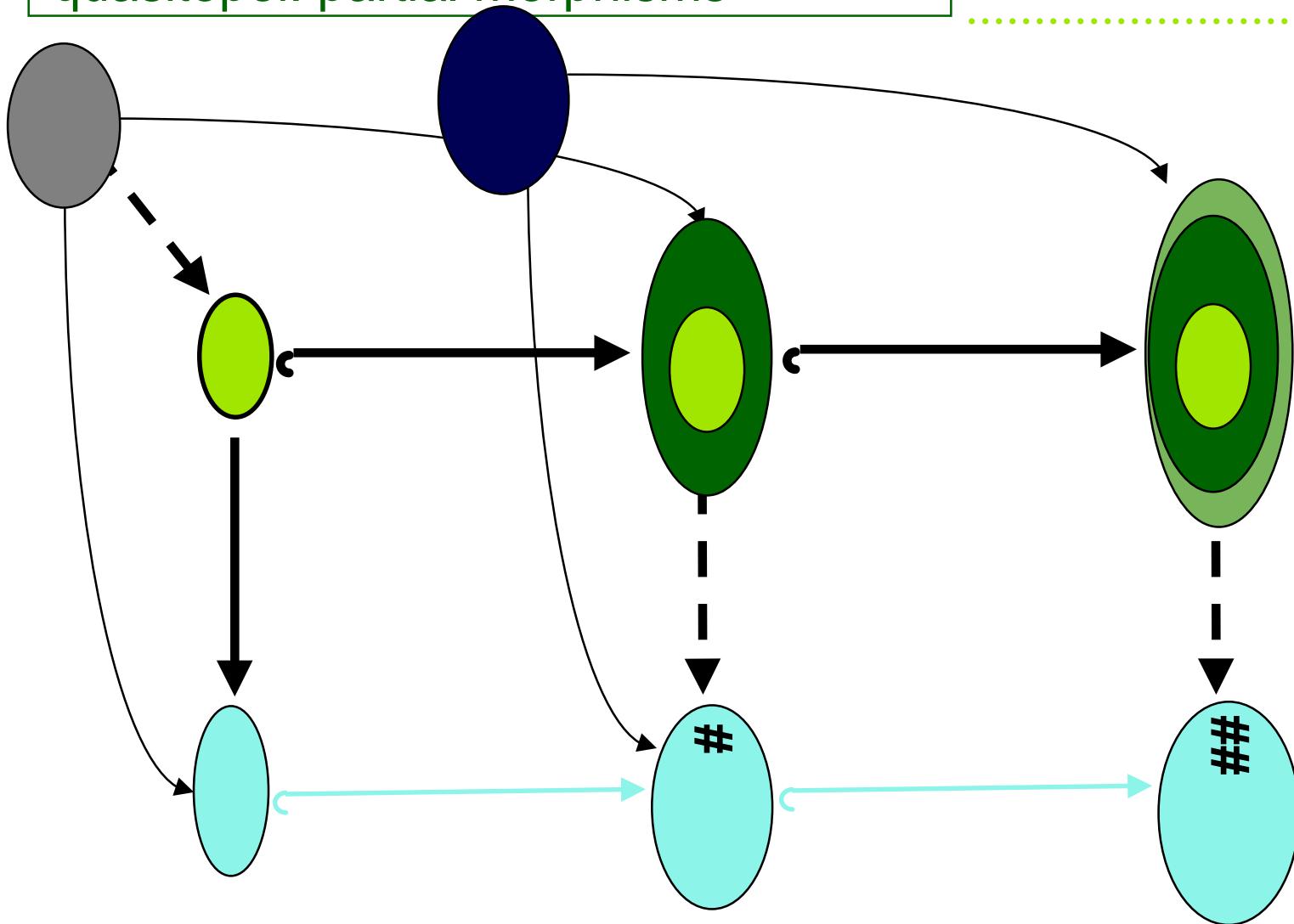
quasitopoi: partial morphisms



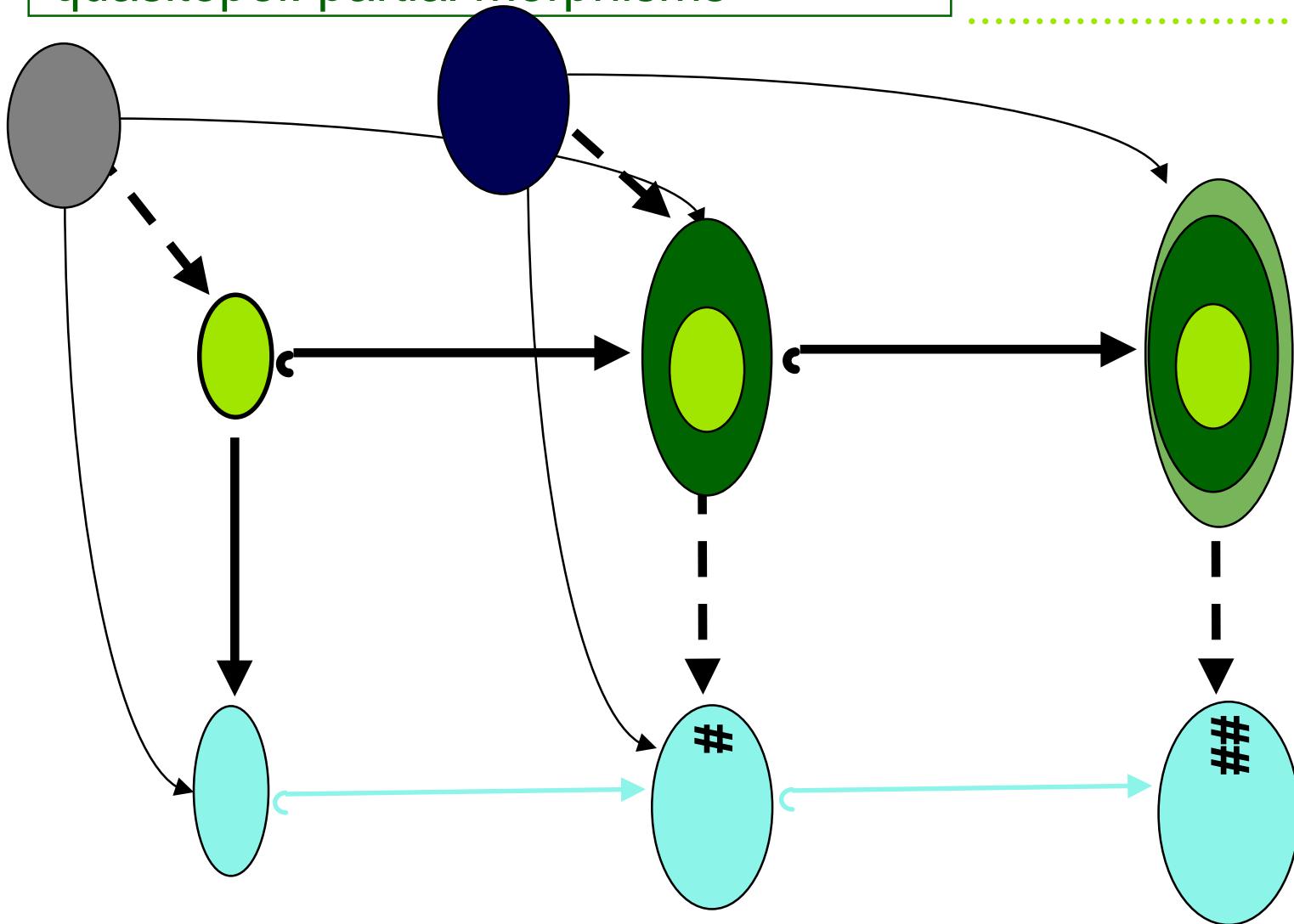
quasitopoi: partial morphisms



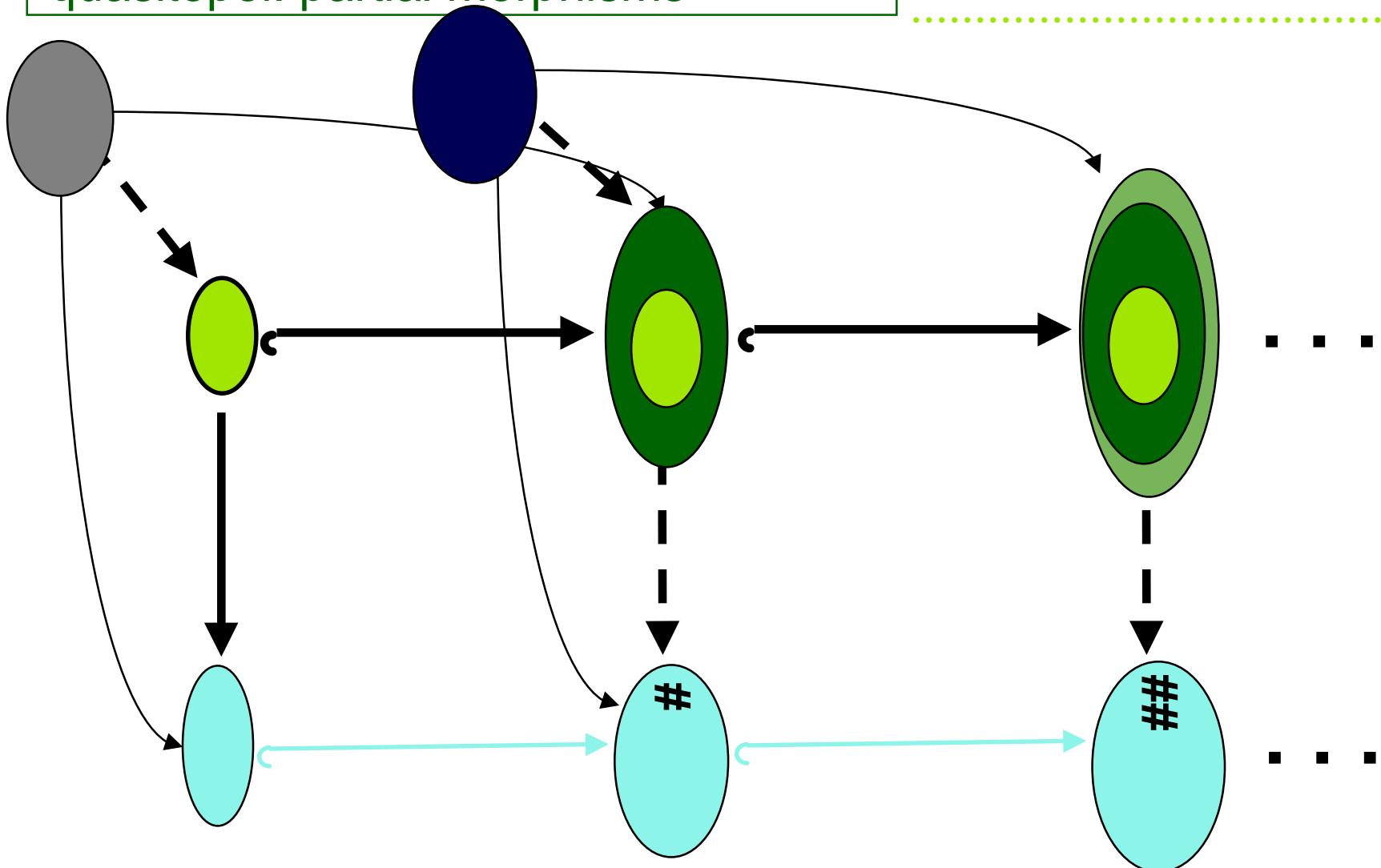
quasitopoi: partial morphisms



quasitopoi: partial morphisms



quasitopoi: partial morphisms



TOP
top cat
but part. morph.
are **not repr.**



TOP
top cat
but part. morph.
are **not** repr.

PreTOP
top cat and
part. morph.
are repr.



PsTOP top cat and quasitopos

TOP
top cat
but part. morph.
are **not** repr.

PreTOP
top cat and
part. morph.
are repr.



Lim etc.

PsTOP top cat and quasitopos

PreTOP
top cat and
part. morph.
are repr.

TOP
top cat
but part. morph.
are **not** repr.



in practice:

Lim etc.

- ~ look for non idempotent hull operators
- ~ look for "partial knowledge"
- ~ look for extensions

**pretopologies have the “build in”
iterative process, in particular
needed, if no direct solutions are
possible and/or known !!!**



H² category theory

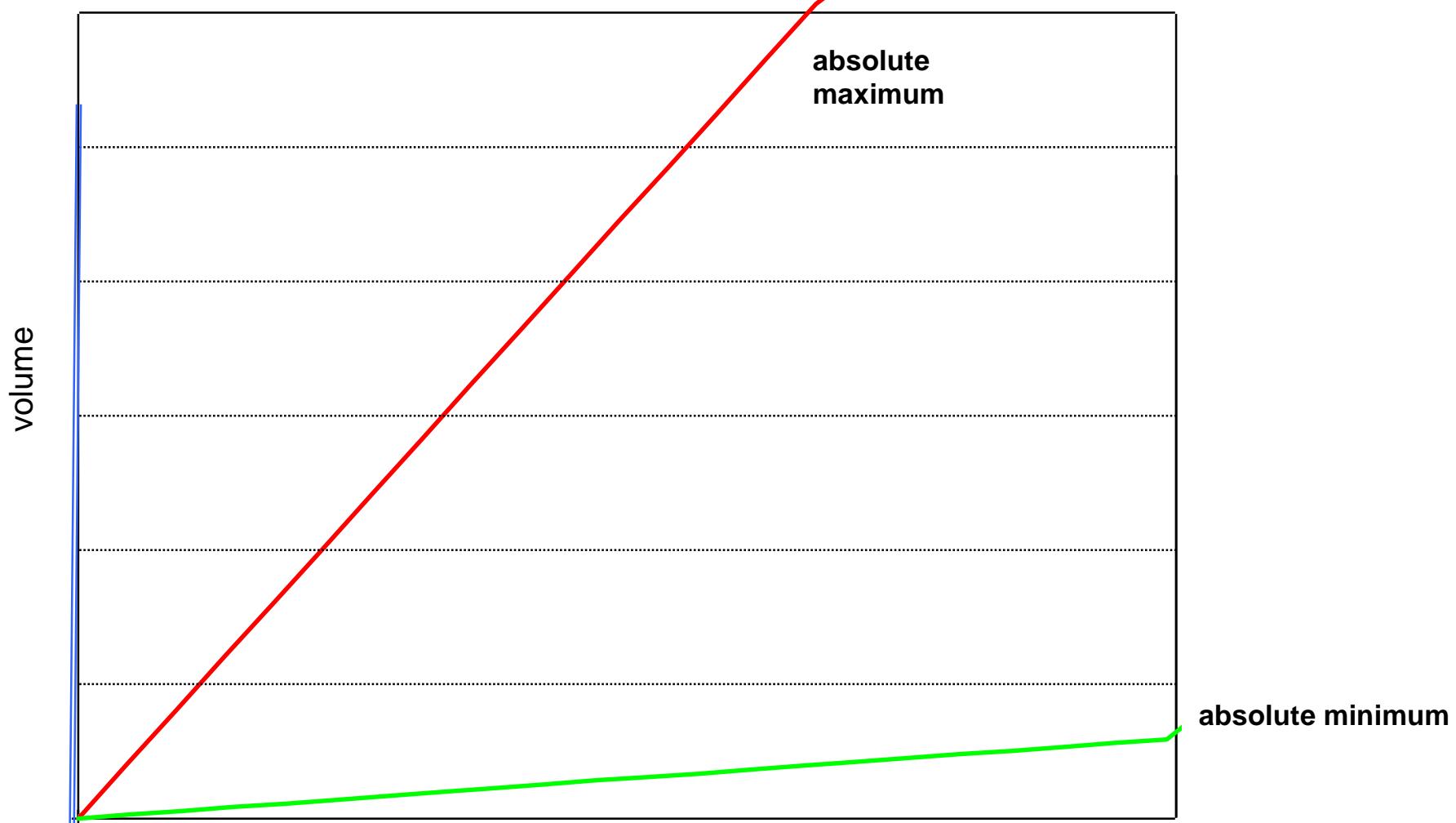
- ❖ topological categories
- ❖ quasitopoi

H² applications / optimization

- ❖ load balancing
- ❖ bin packing
- ❖ demand/supply balancing
- ❖ forecasting



side constraints: production/contracts



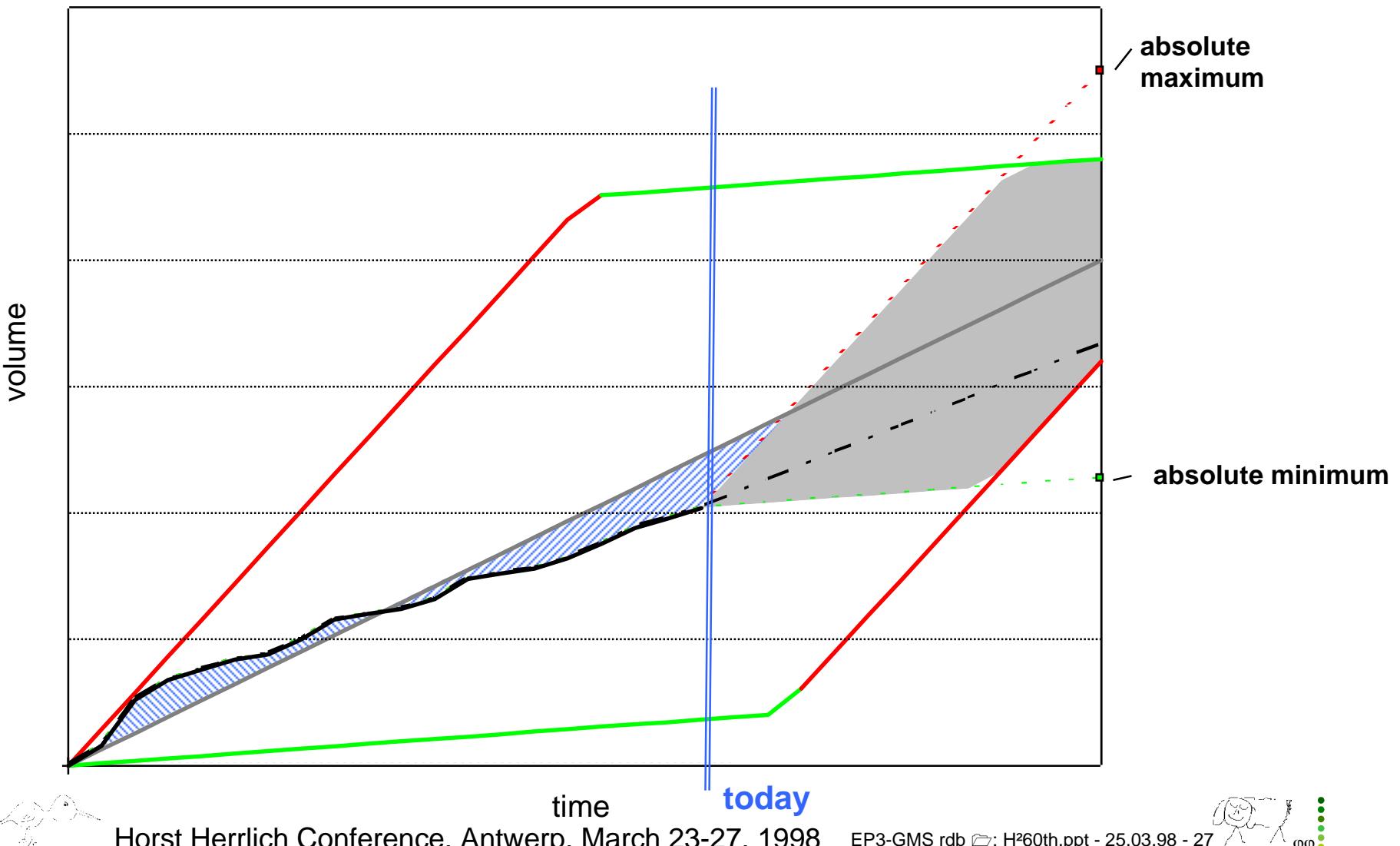
today

Horst Herrlich Conference, Antwerp, March 23-27, 1998

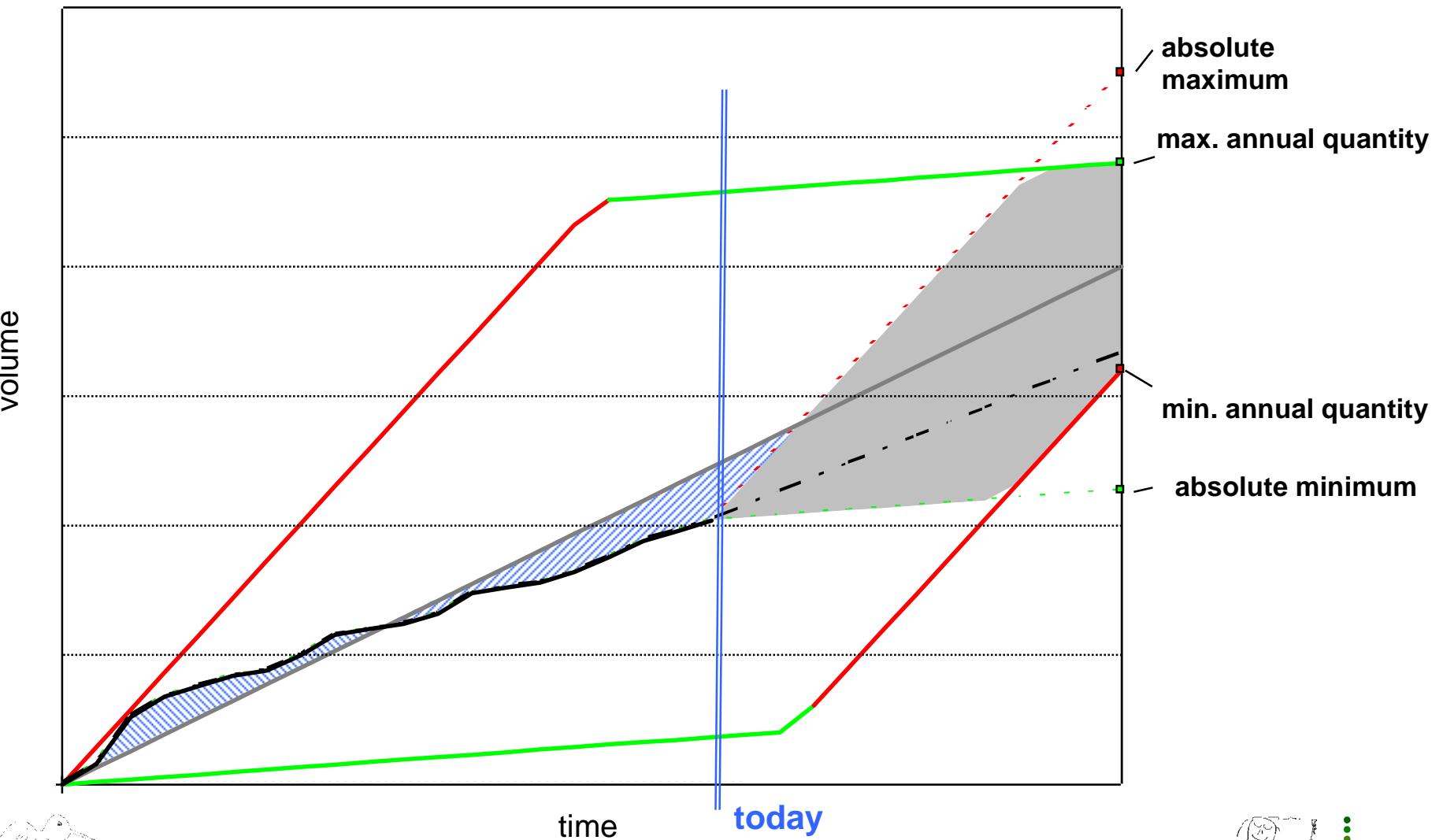
EP3-GMS rdb H²60th.ppt - 25.03.98 - 26



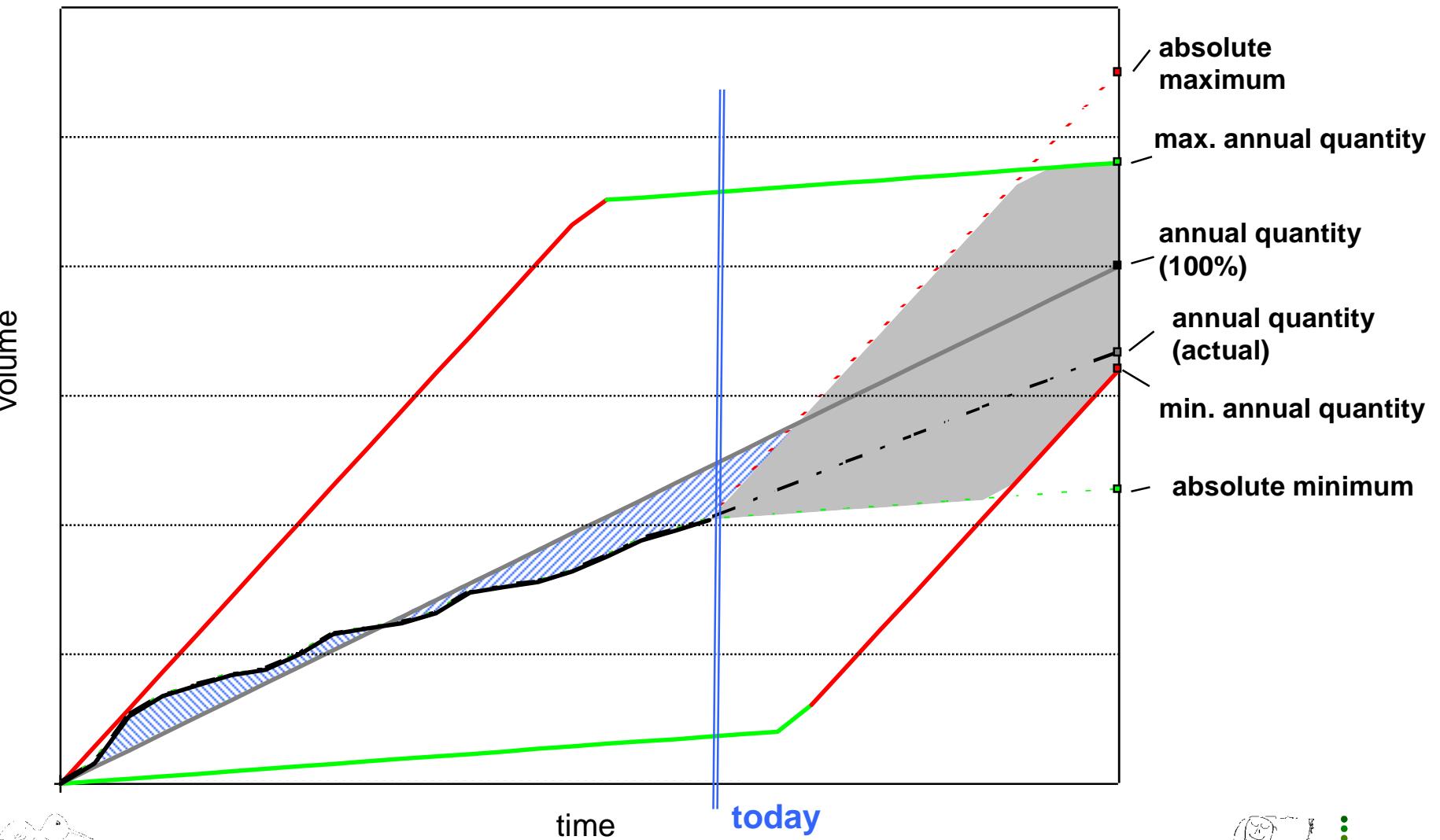
side constraints: production/contracts



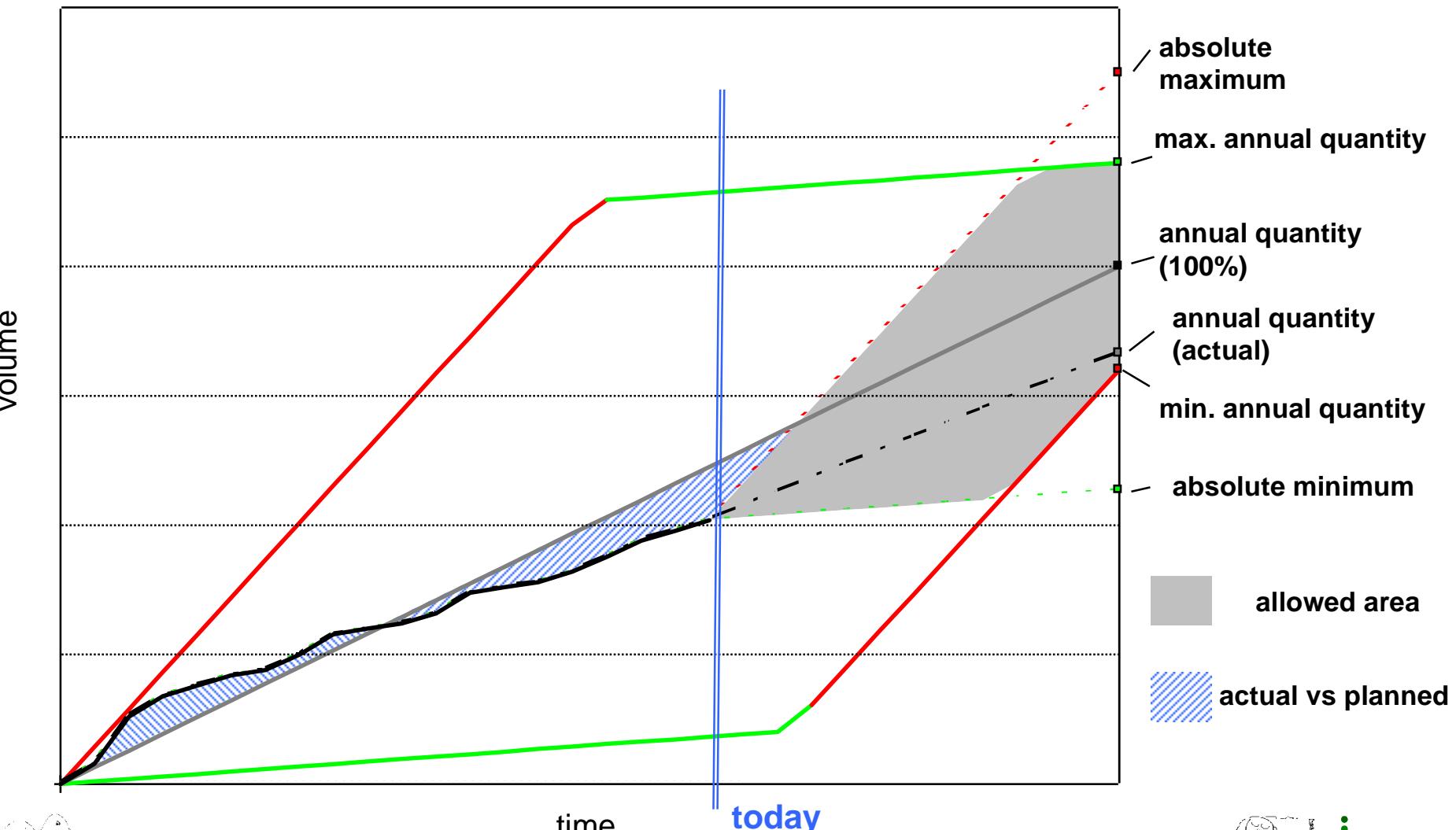
side constraints: production/contracts



side constraints: production/contracts

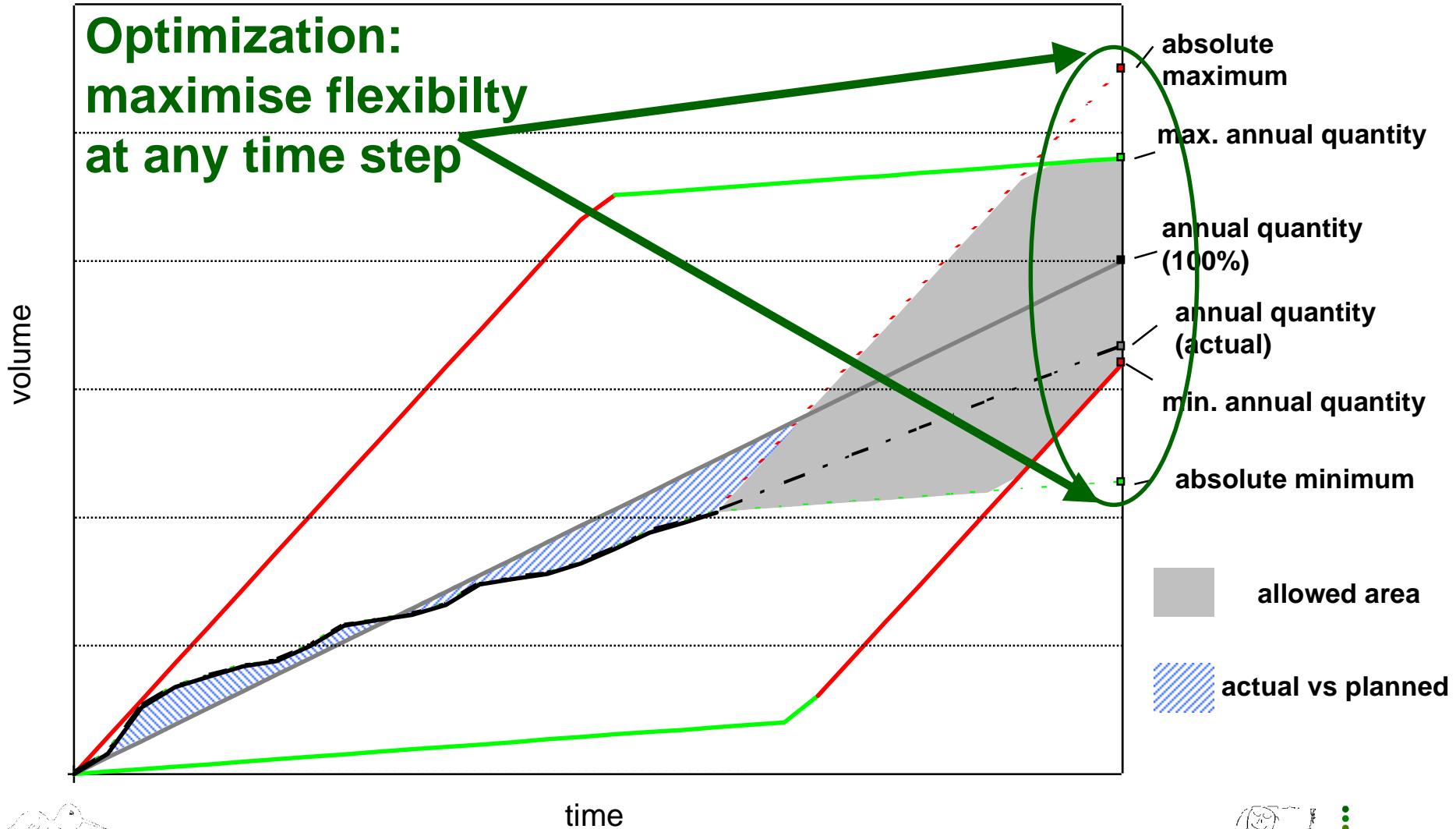


side constraints: production/contracts



side constraints: production/contracts

**Optimization:
maximise flexibility
at any time step**



H² category theory

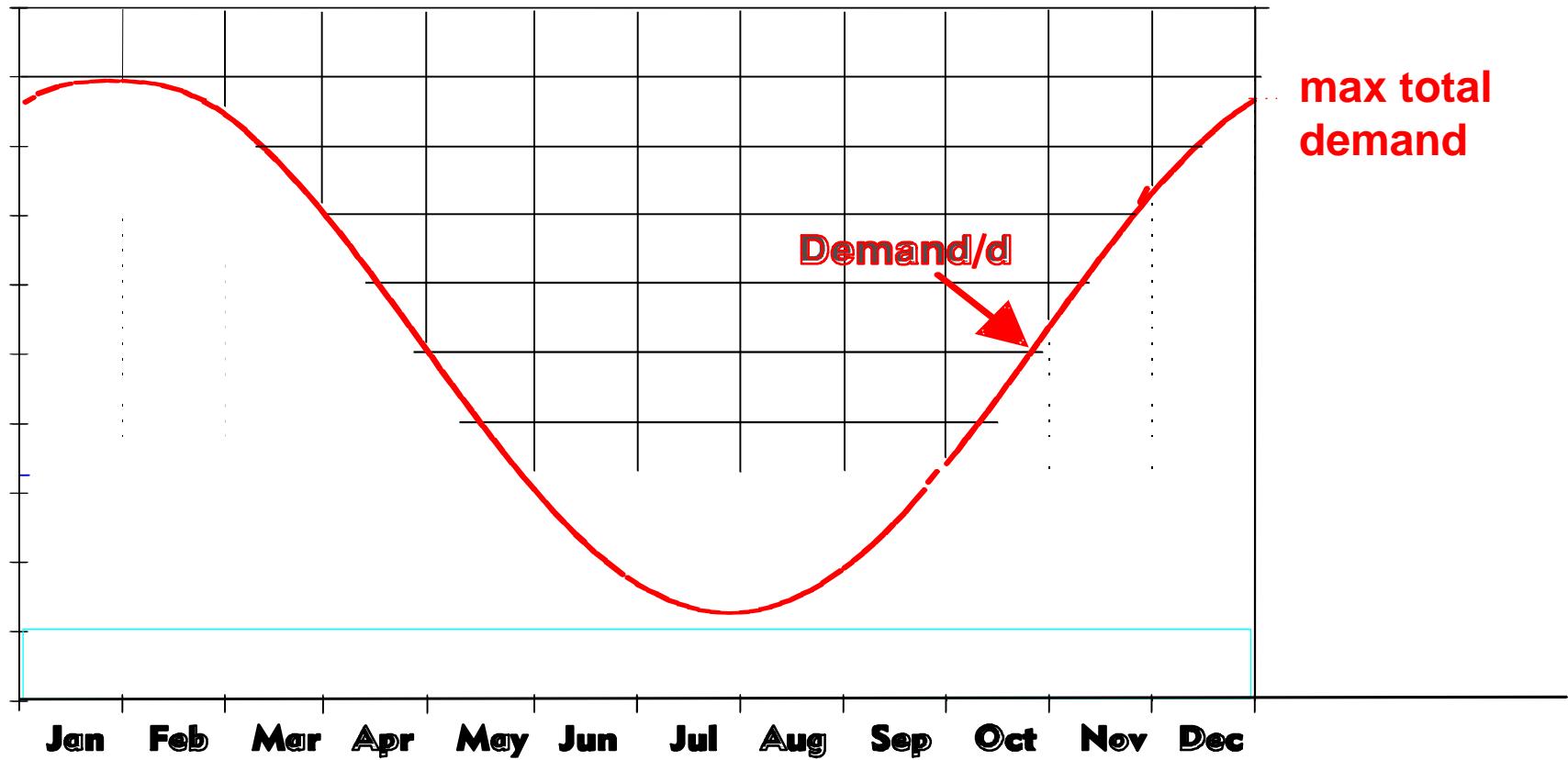
- ❖ topological categories
- ❖ quasitopoi

H² applications / optimization

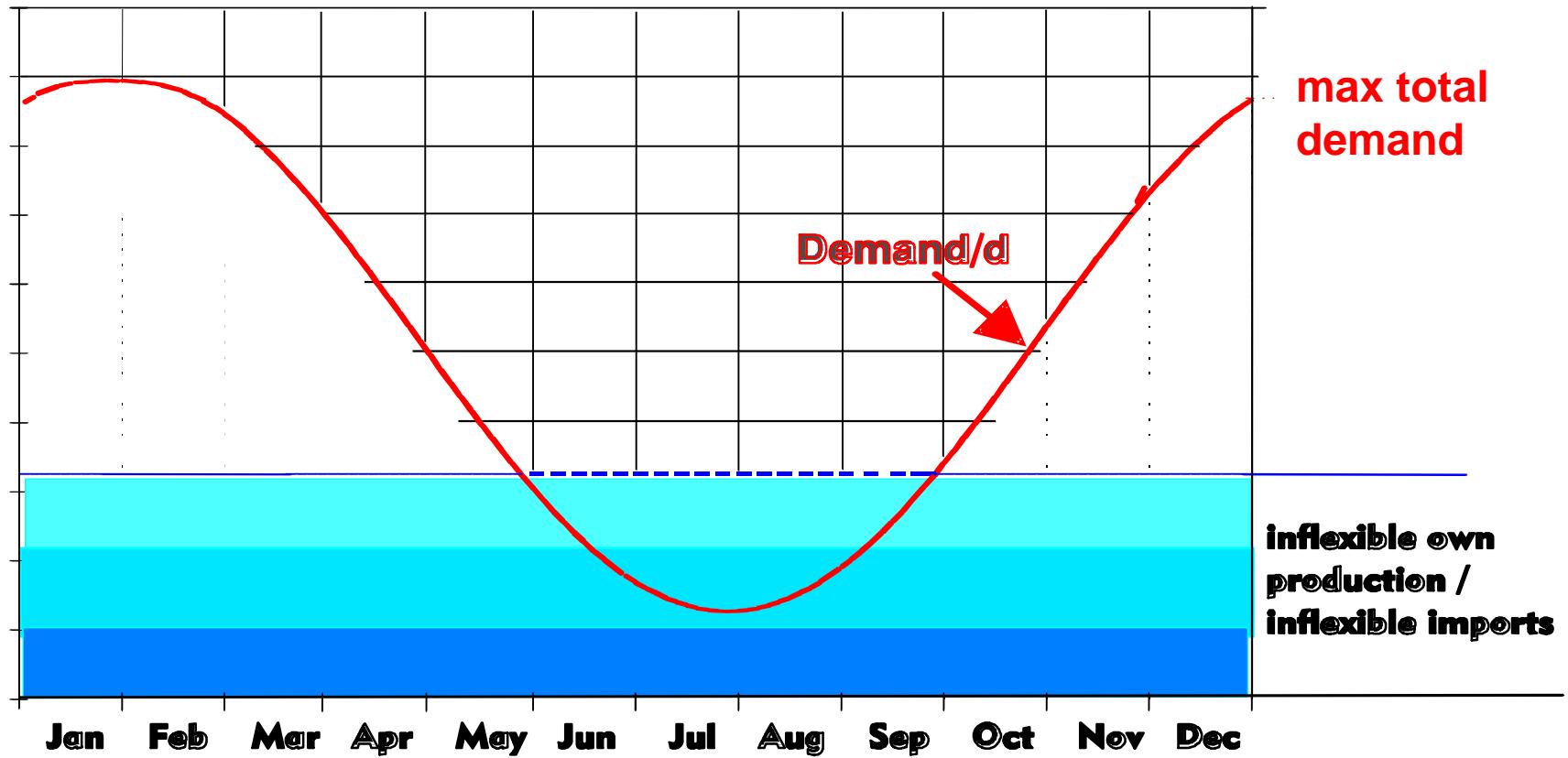
- ❖ load balancing
- ❖ bin packing
- ❖ demand/supply balancing
- ❖ forecasting



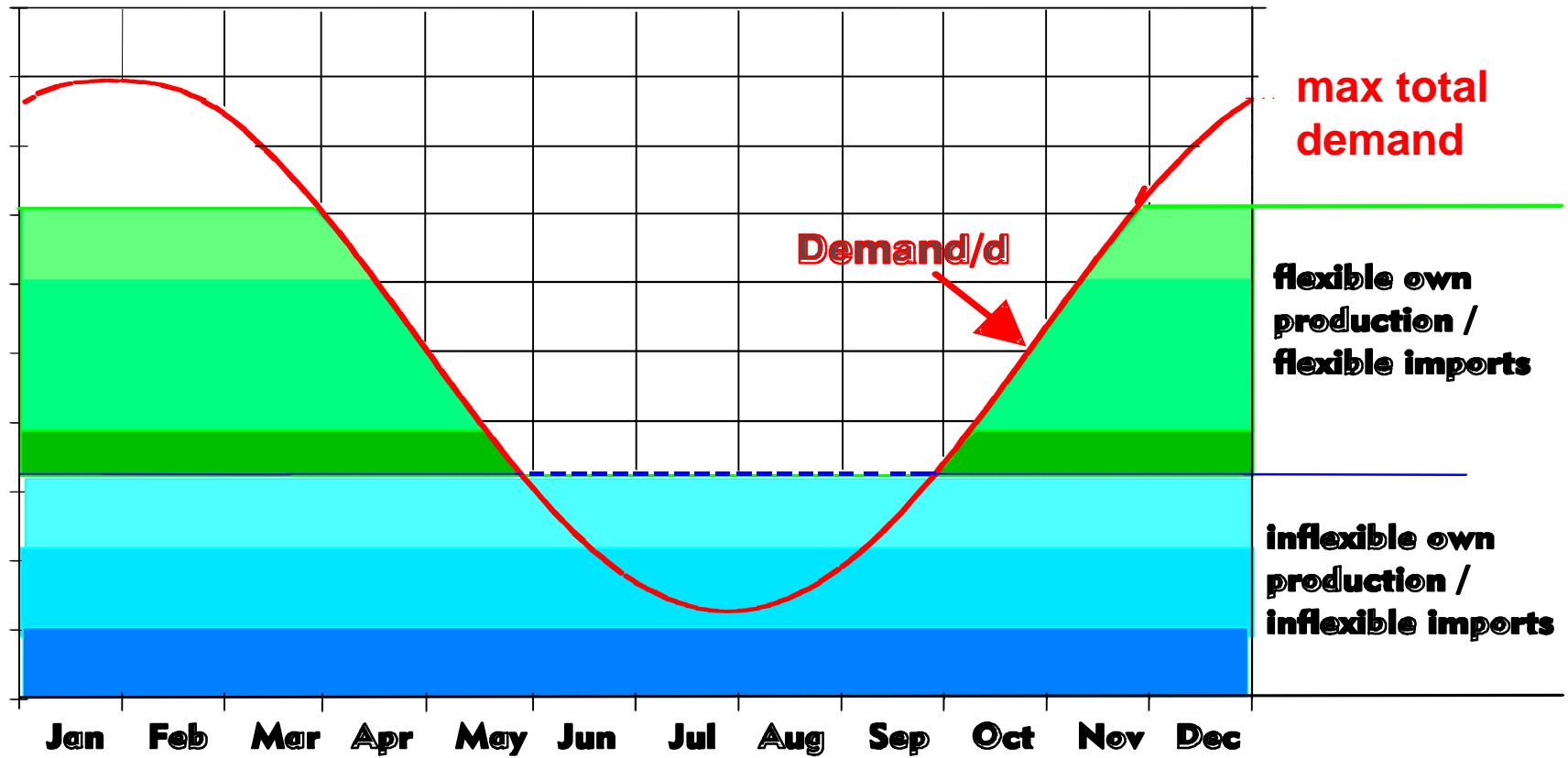
load balancing = optimal packing



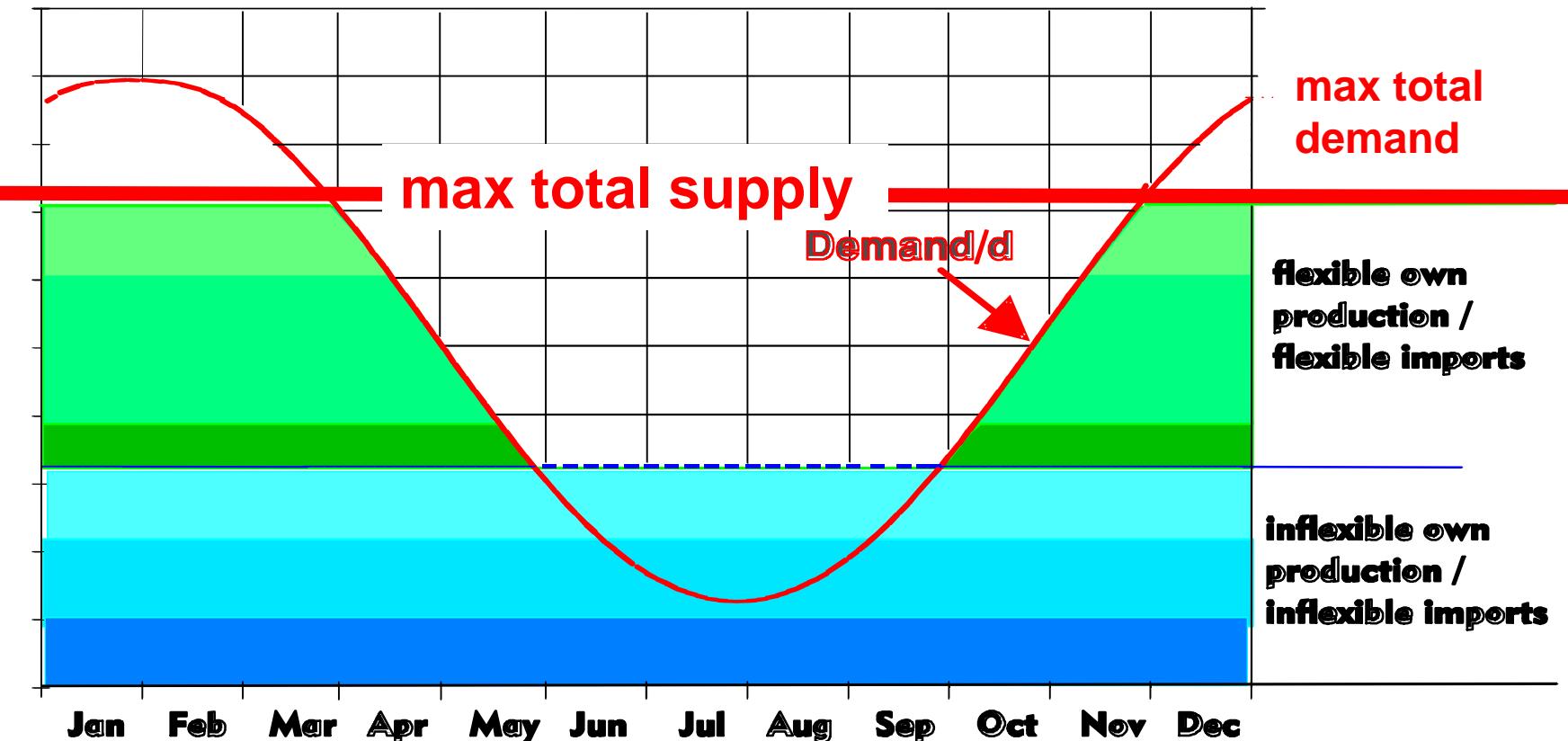
load balancing = optimal packing



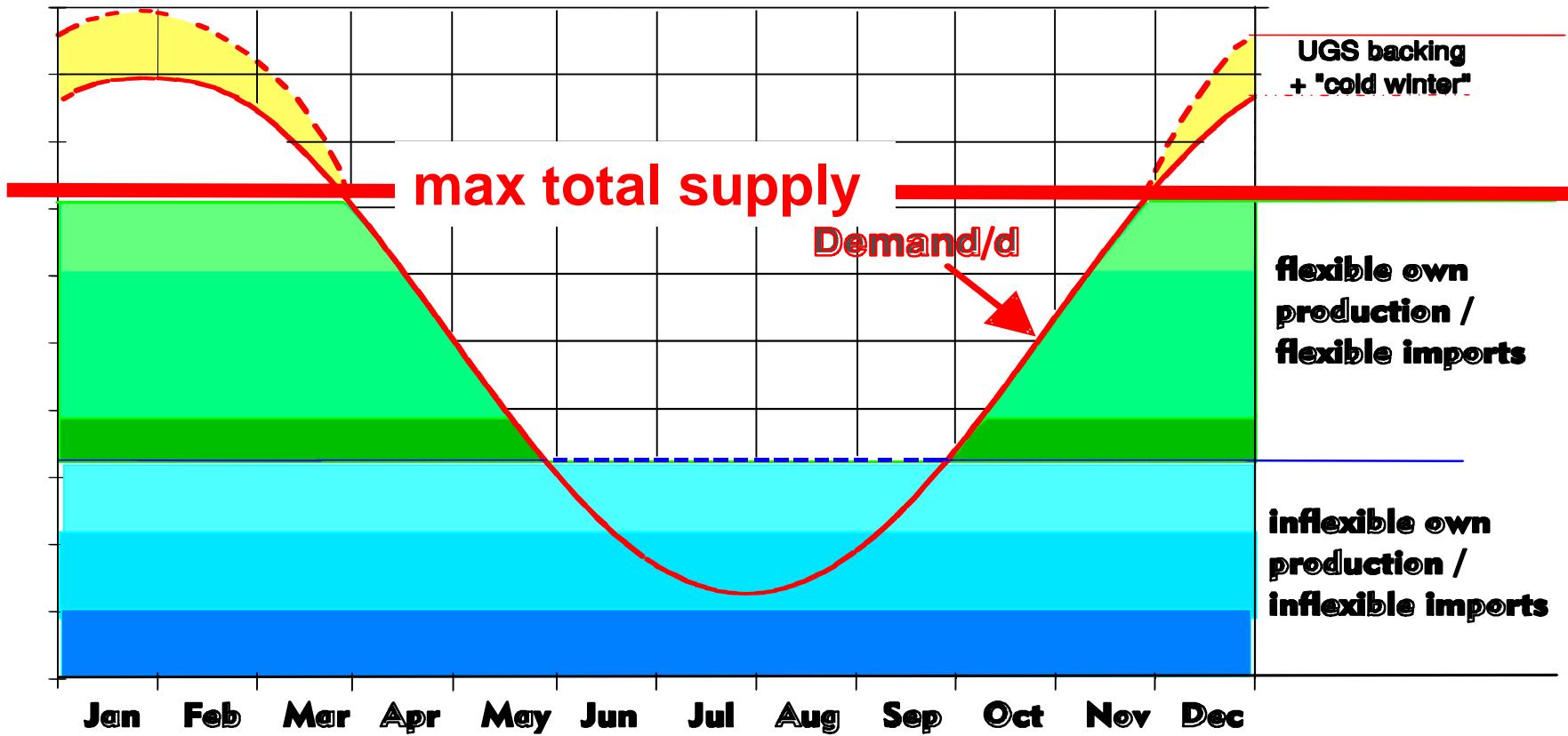
load balancing = optimal packing



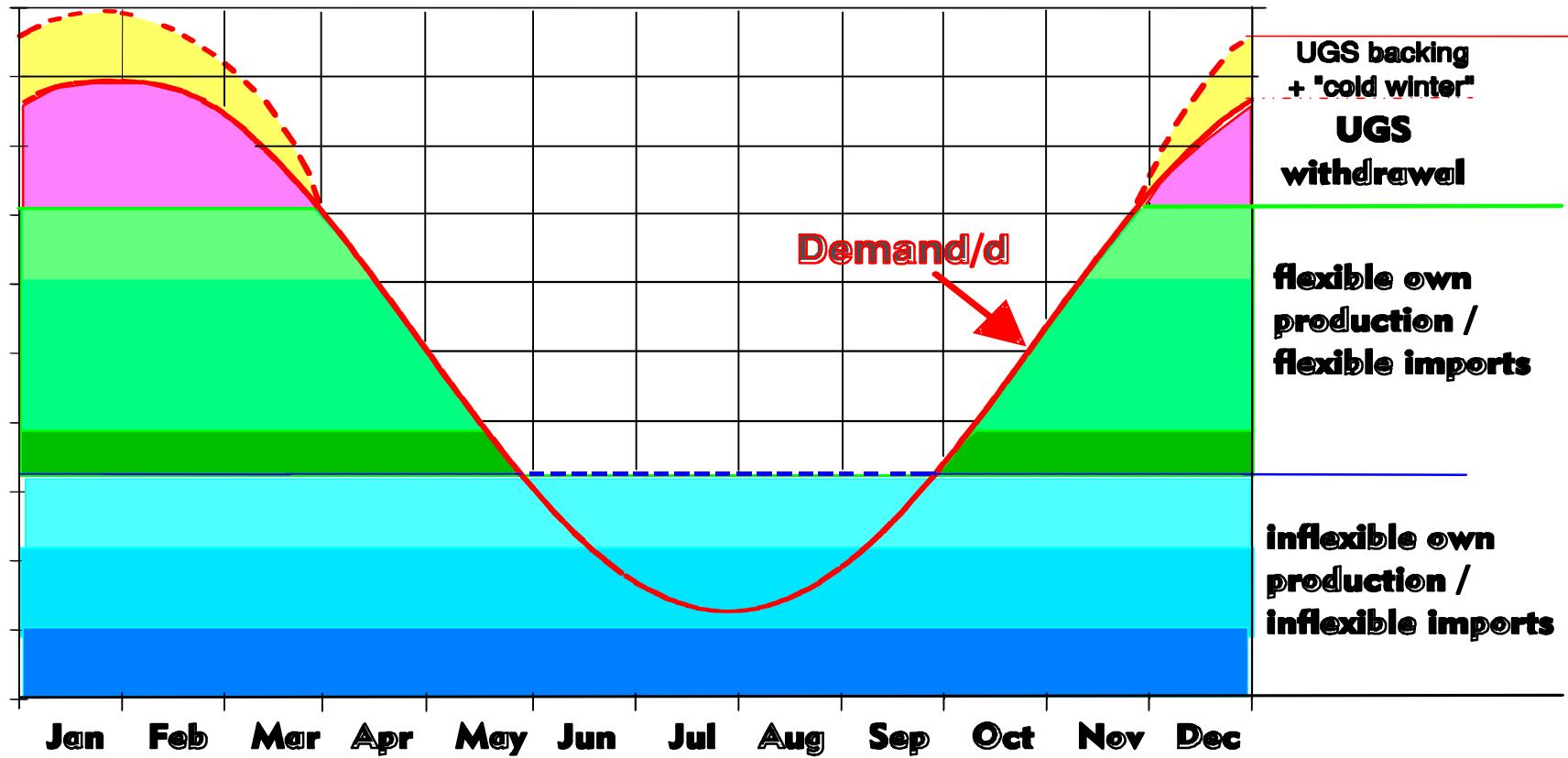
load balancing = optimal packing

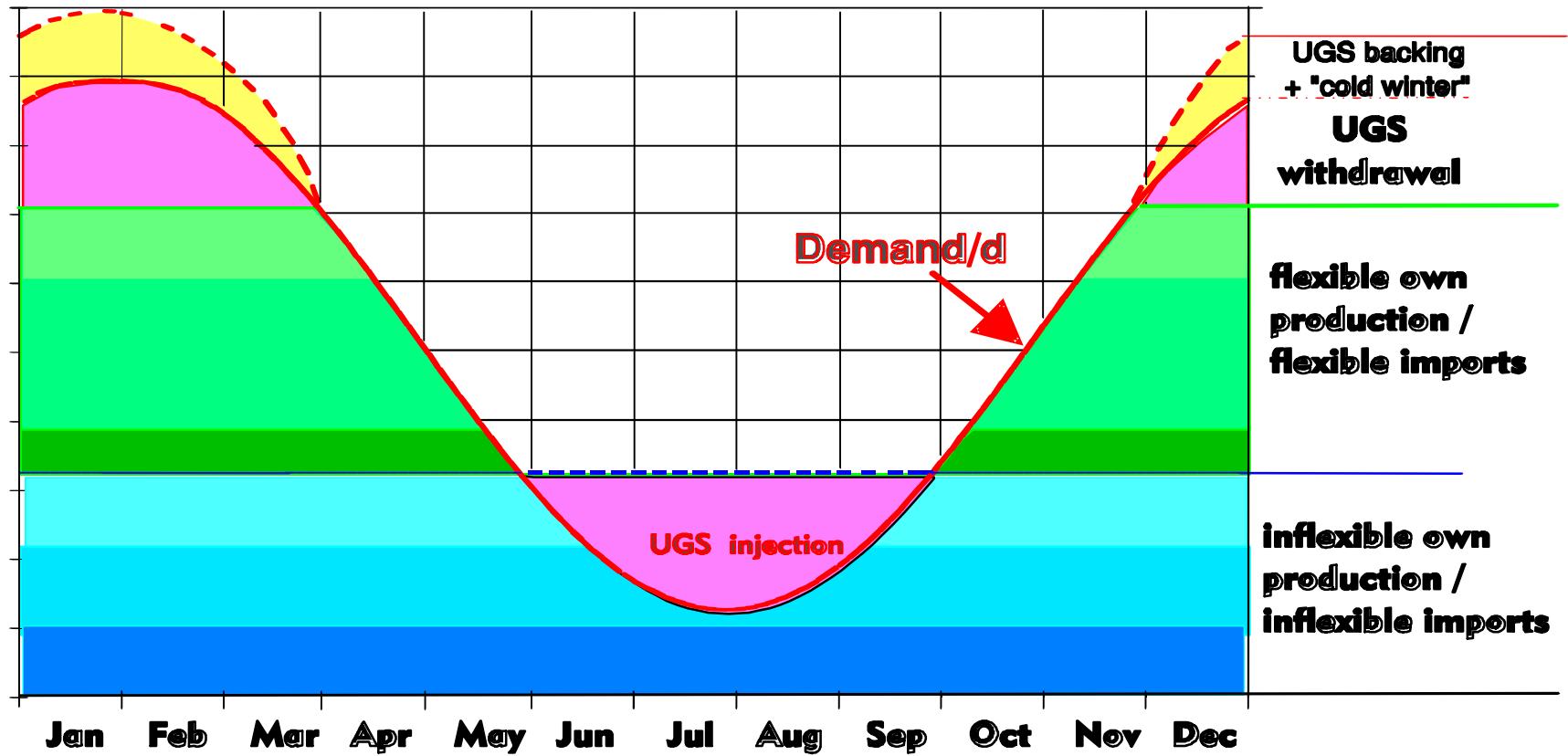


load balancing = optimal packing

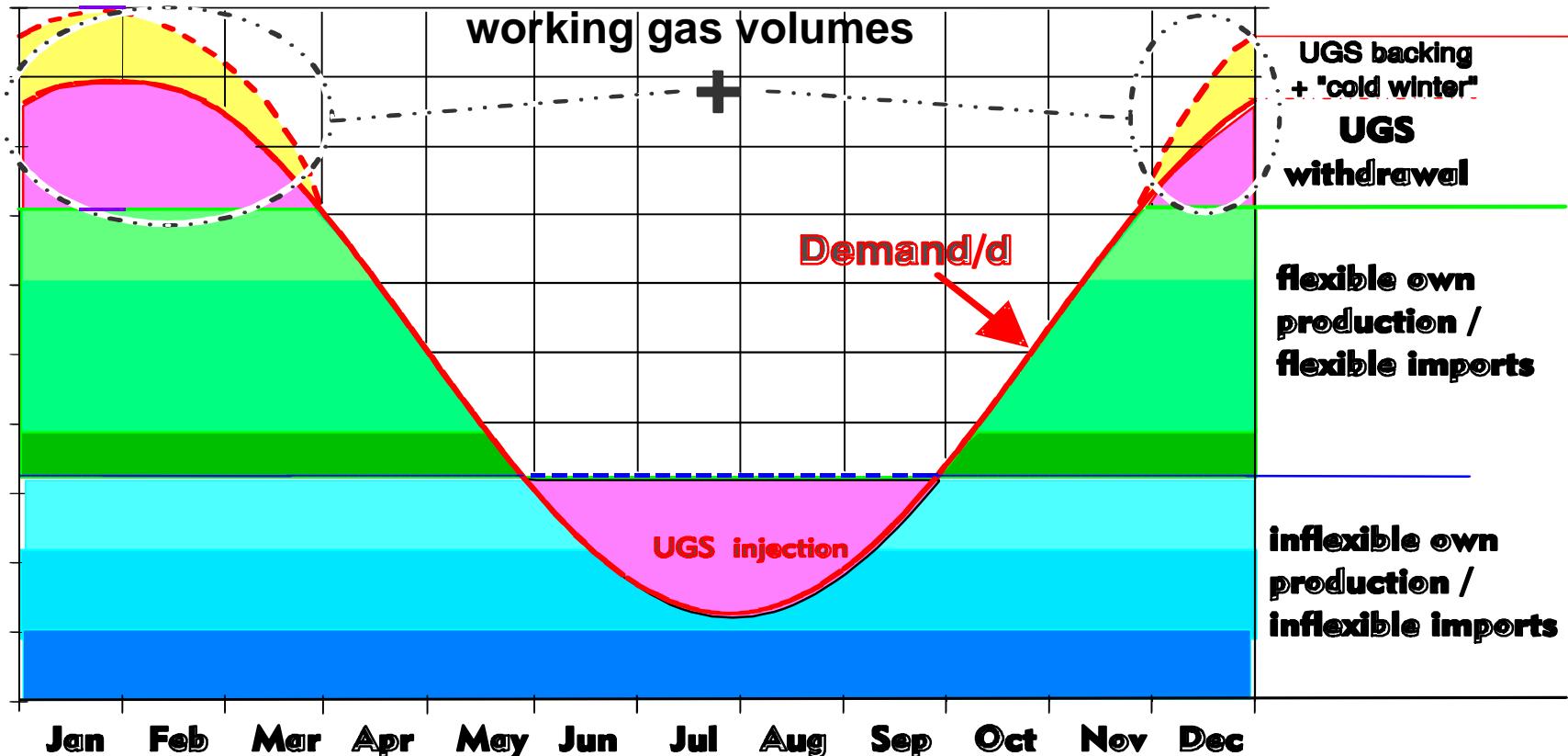


load balancing = optimal packing





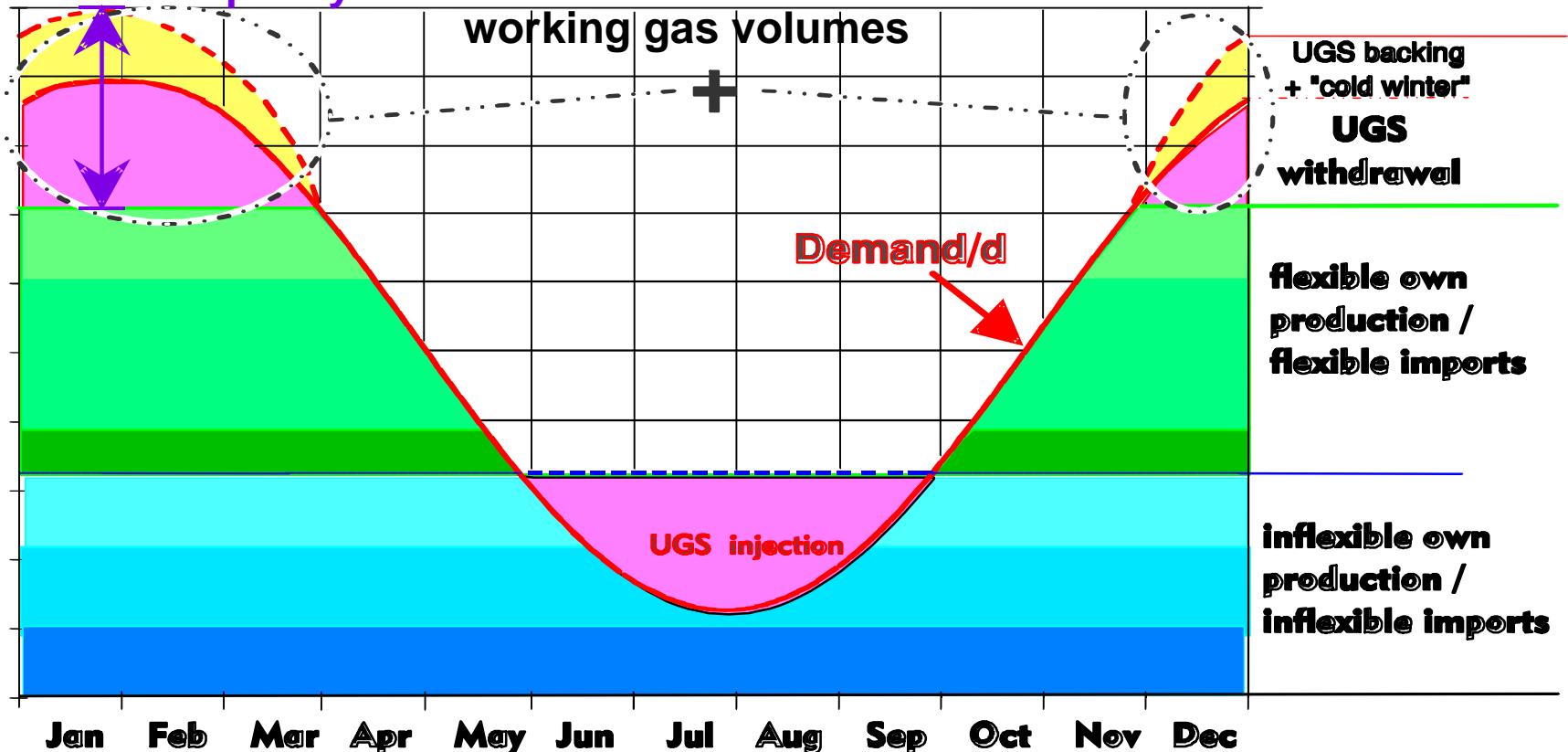
1. determination of required working gas volumes



load balancing

2. determination of required withdrawal capacity

1. determination of required working gas volumes

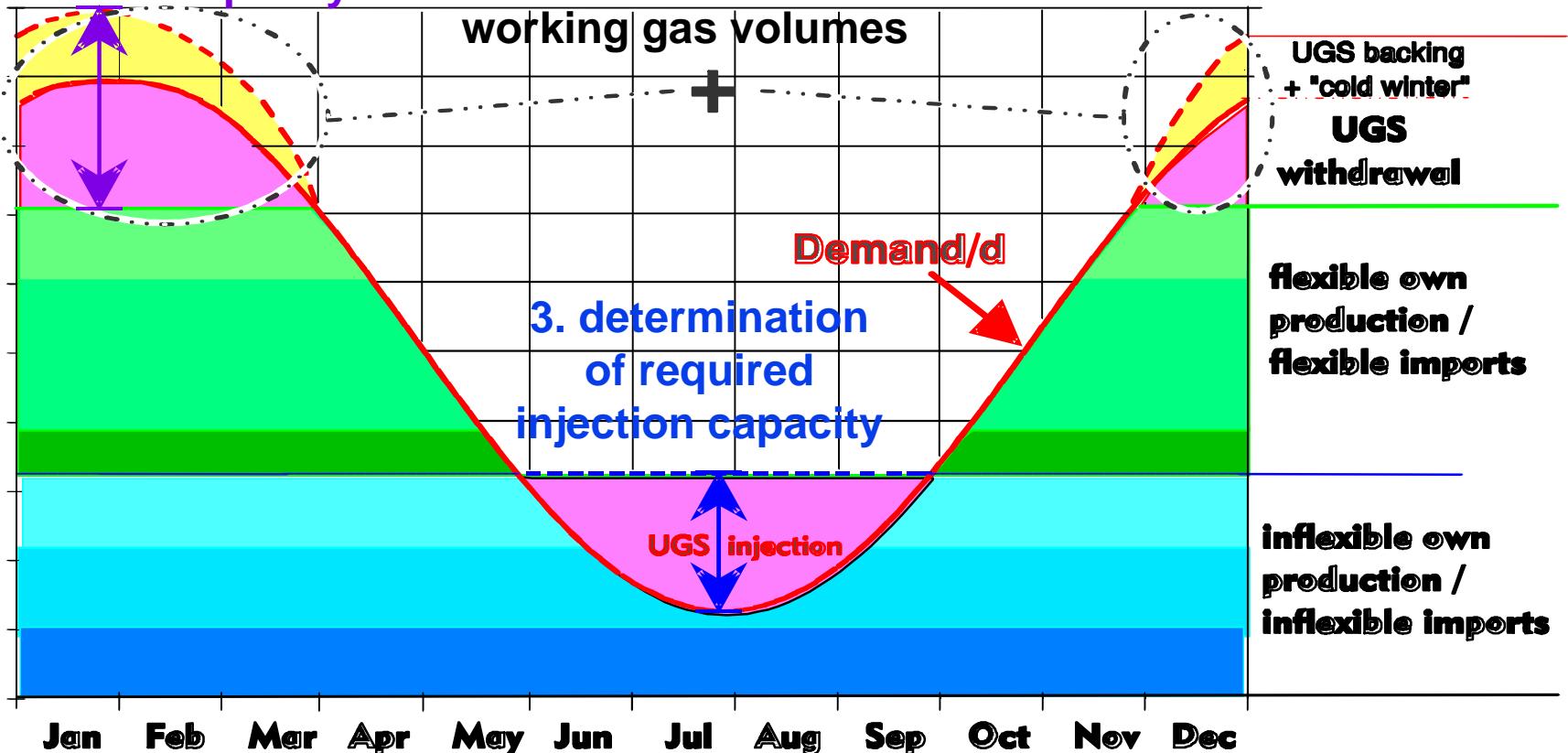


load balancing

2. determination
of required
withdrawal capacity

1. determination
of required
working gas volumes

3. determination
of required
injection capacity



H² category theory

- ❖ topological categories
- ❖ quasitopoi

H² applications / optimization

- ❖ load balancing
- ❖ bin packing
- ❖ demand/supply balancing
- ❖ forecasting



applications of bin packing

H^2 category theory

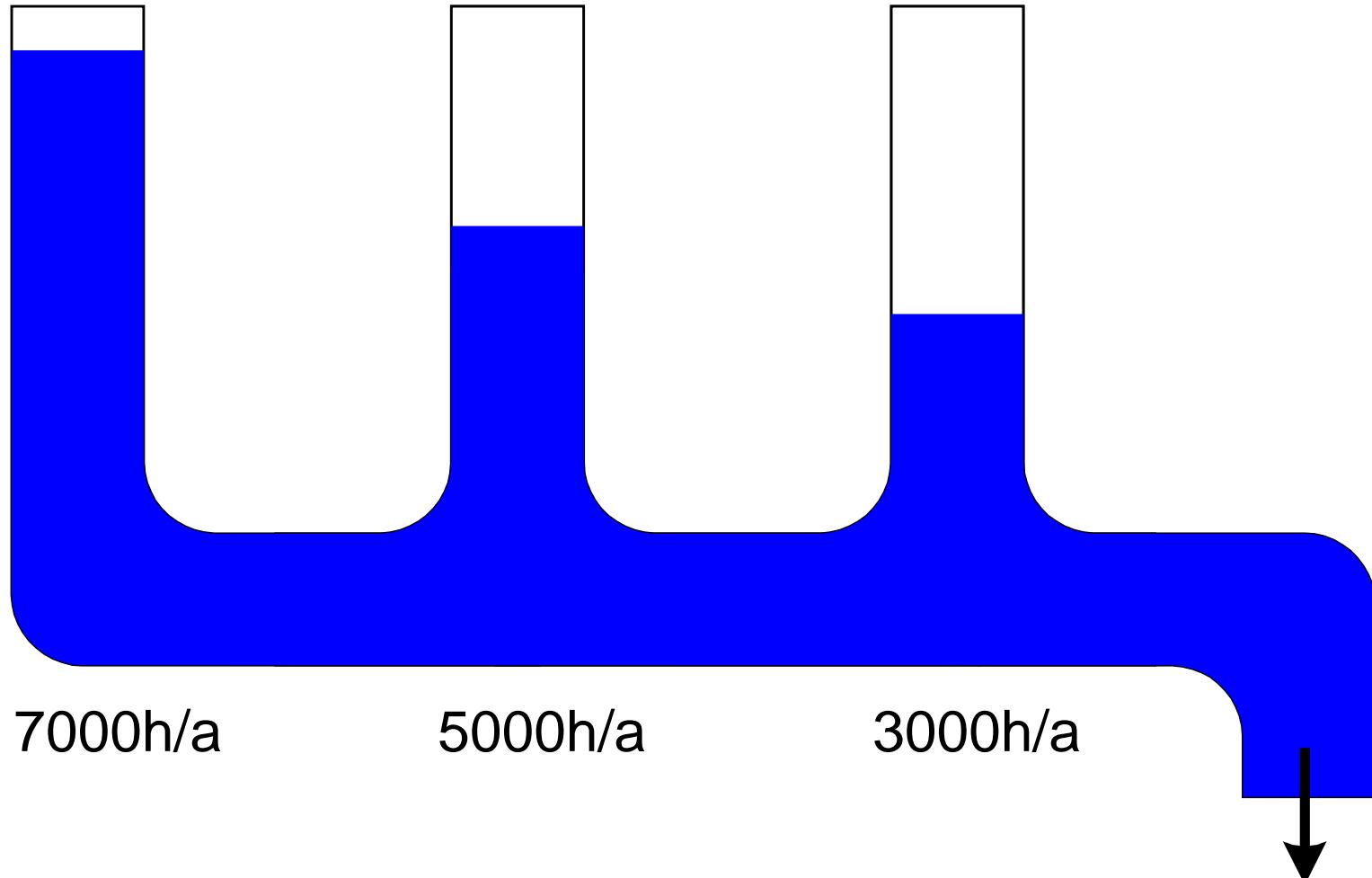
- ❖ topological categories
- ❖ quasitopoi

H^2 applications / optimization

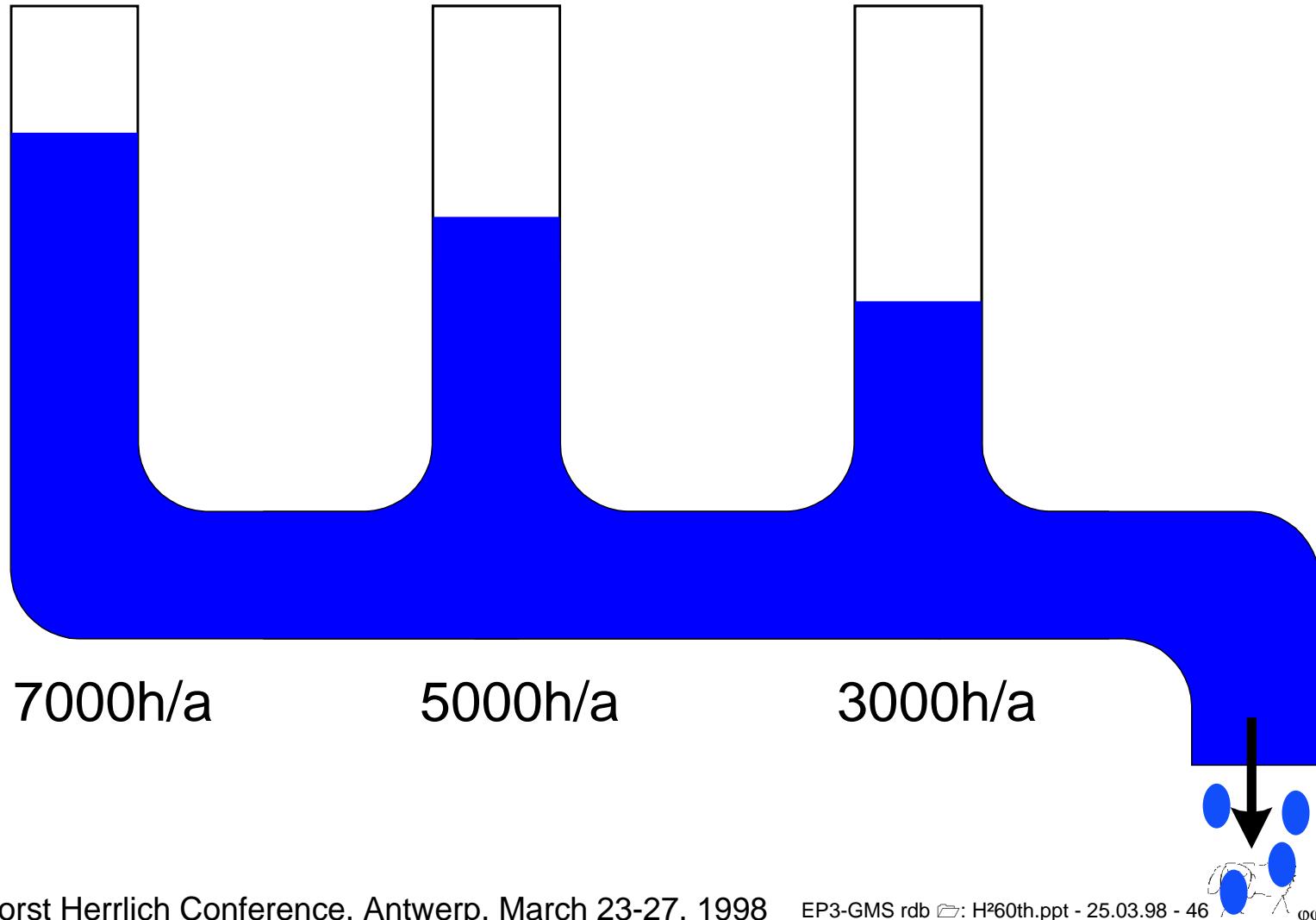
- ❖ load balancing
- ❖ bin packing
- ❖ demand/supply balancing
- ❖ forecasting

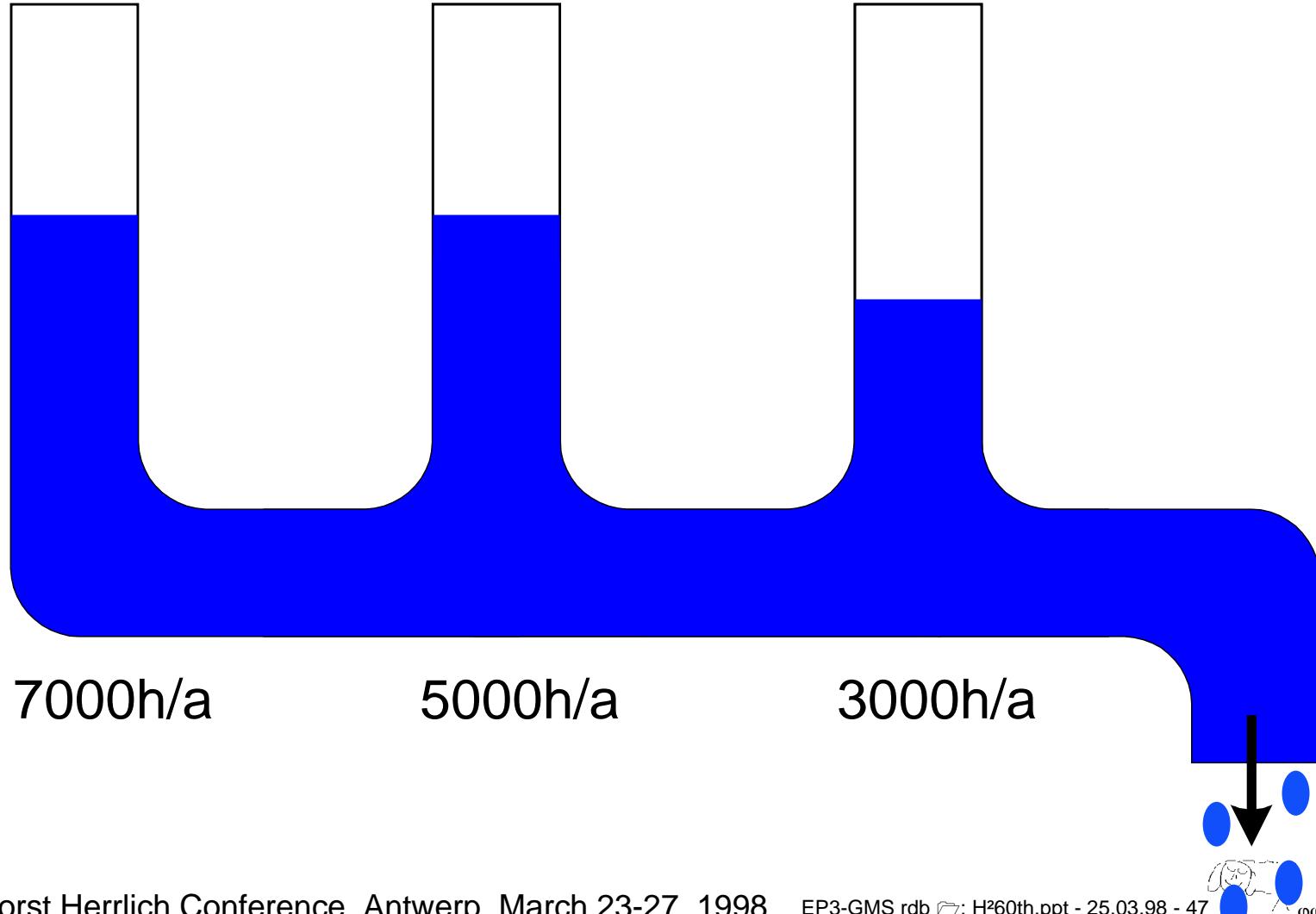
- ❖ wired circuit boards
- ❖ space technology
- ❖ logistics ("decide as late as possible ...")
- ❖ ...
- ❖ balancing of energy grids

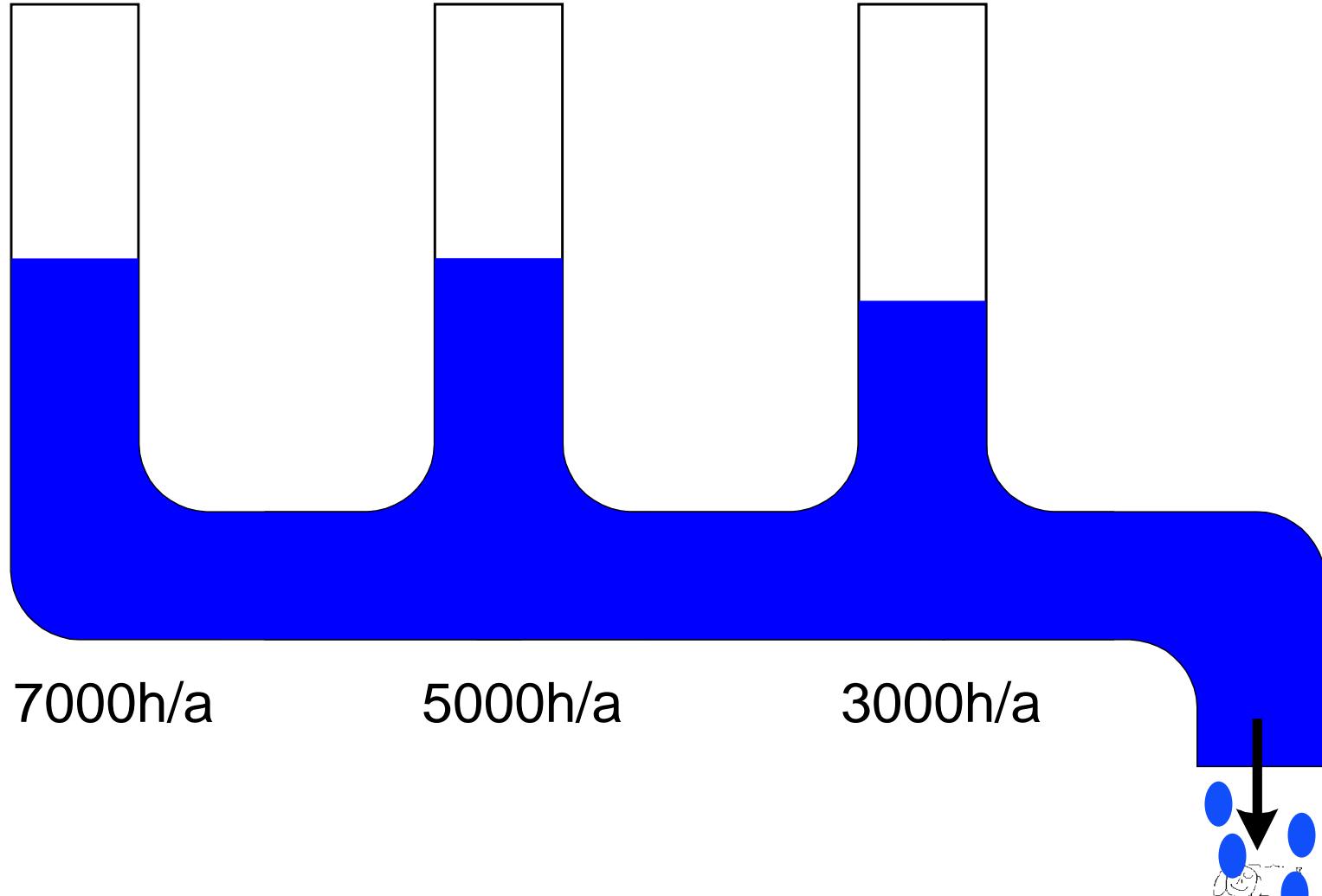


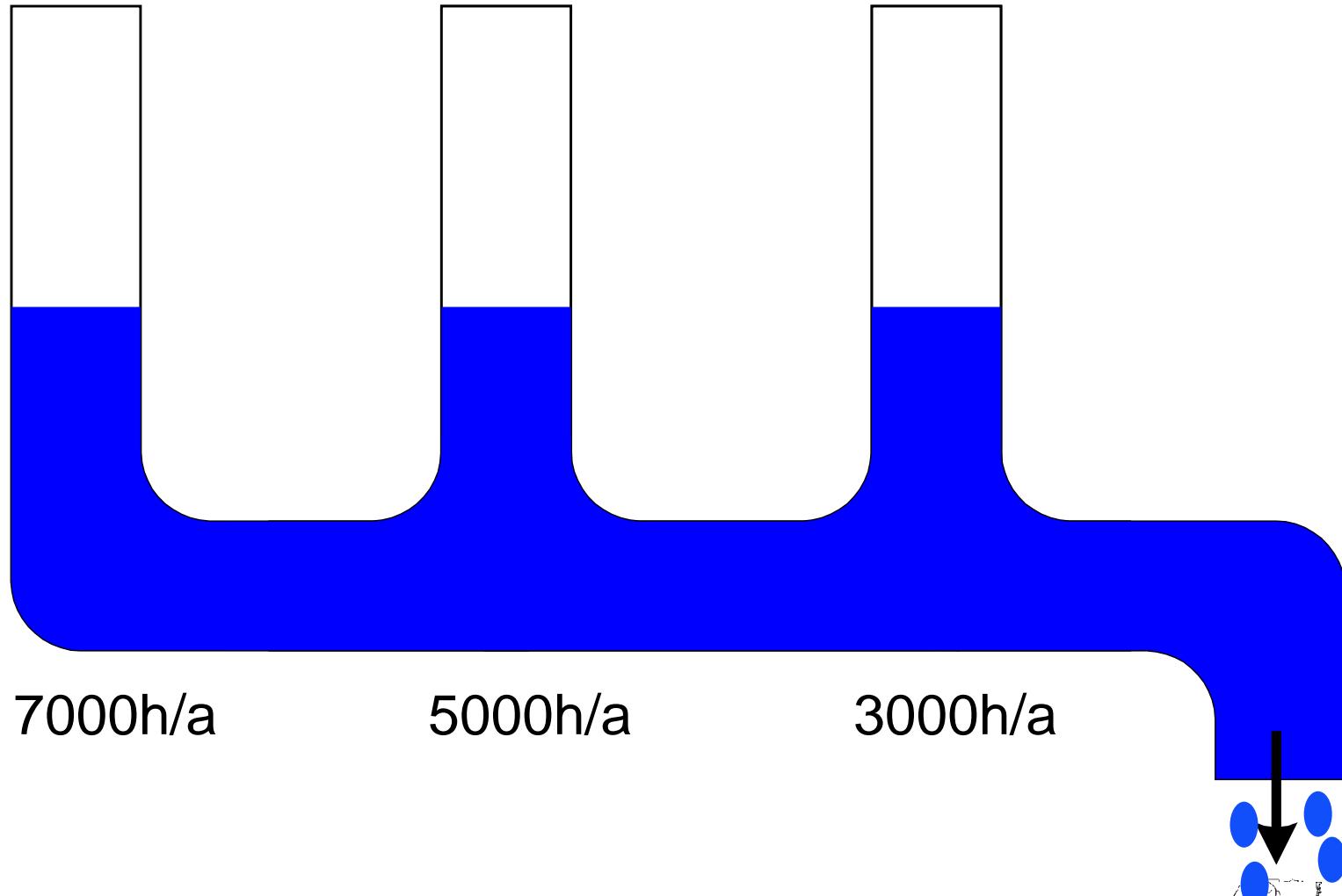


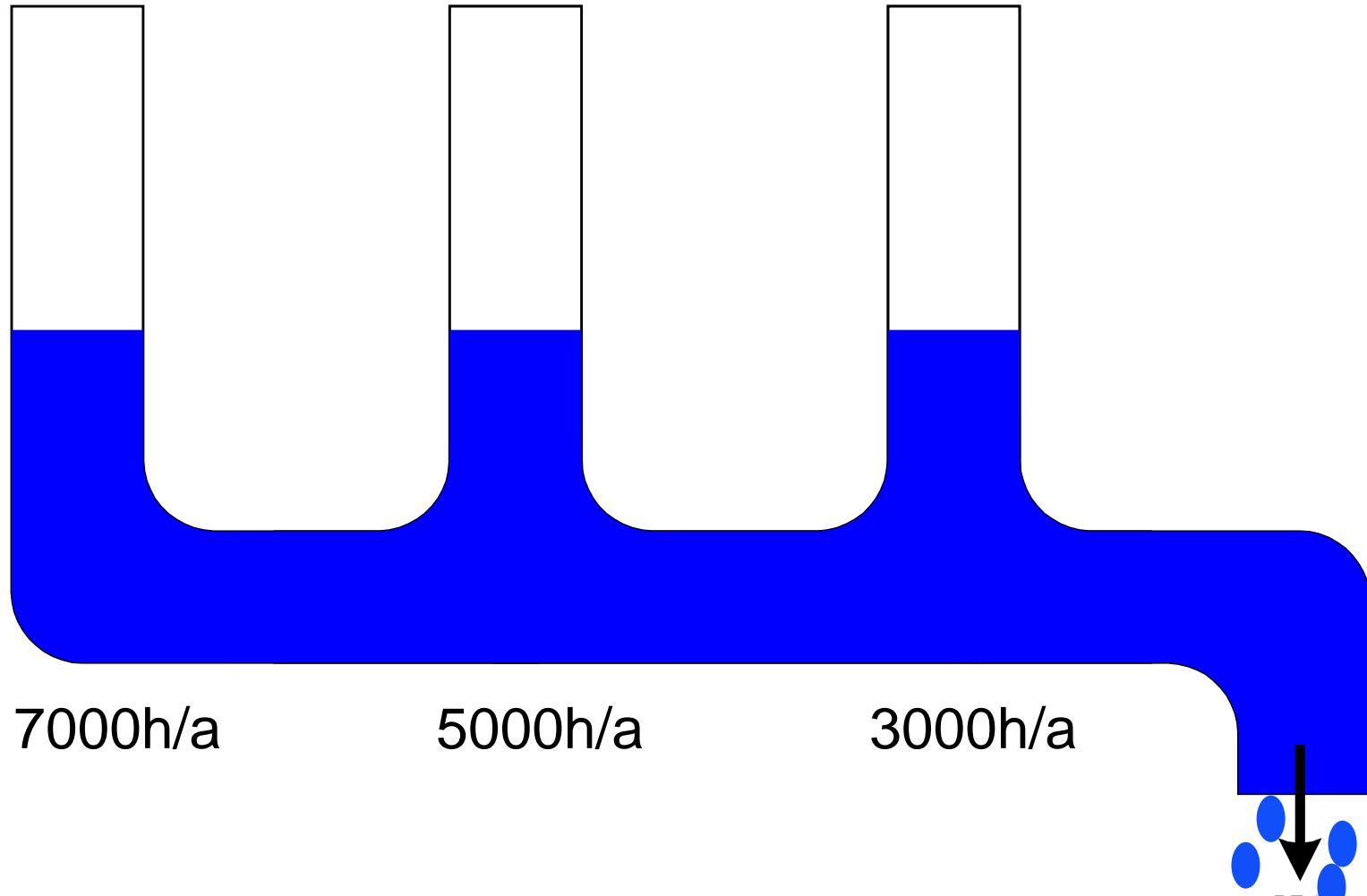
communicating tubes = bin packing

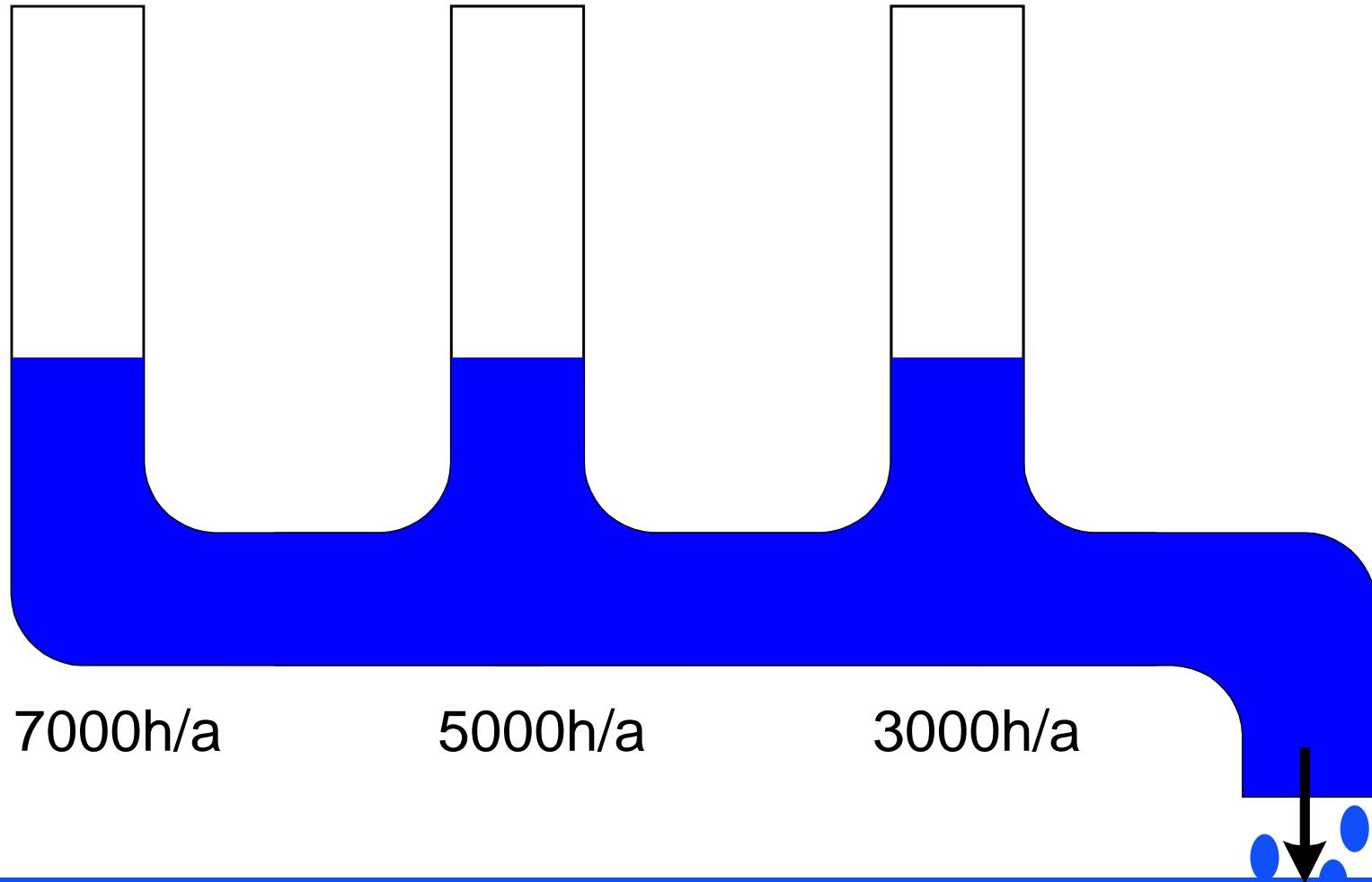


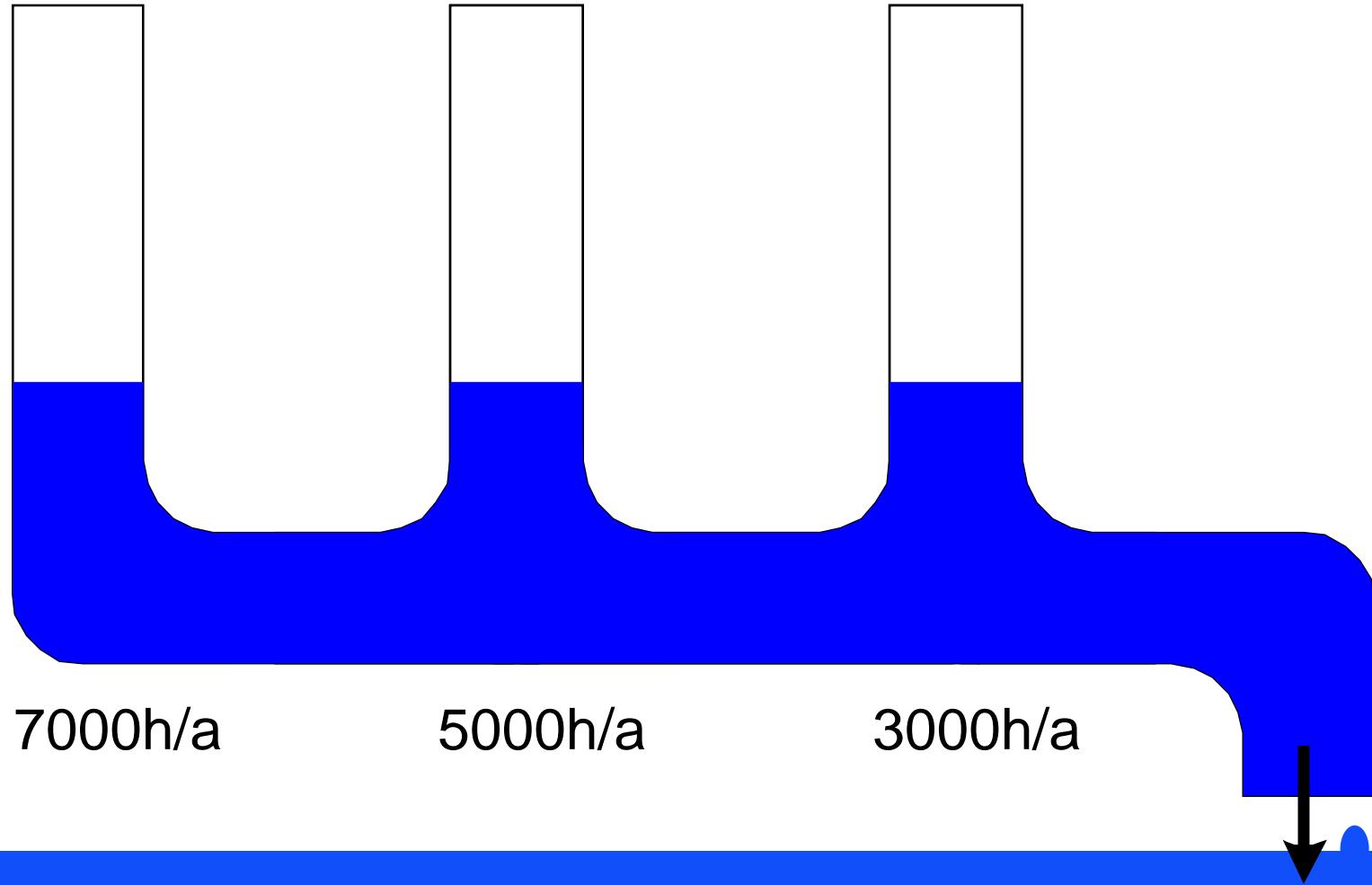












H² category theory

- ❖ topological categories
- ❖ quasitopoi

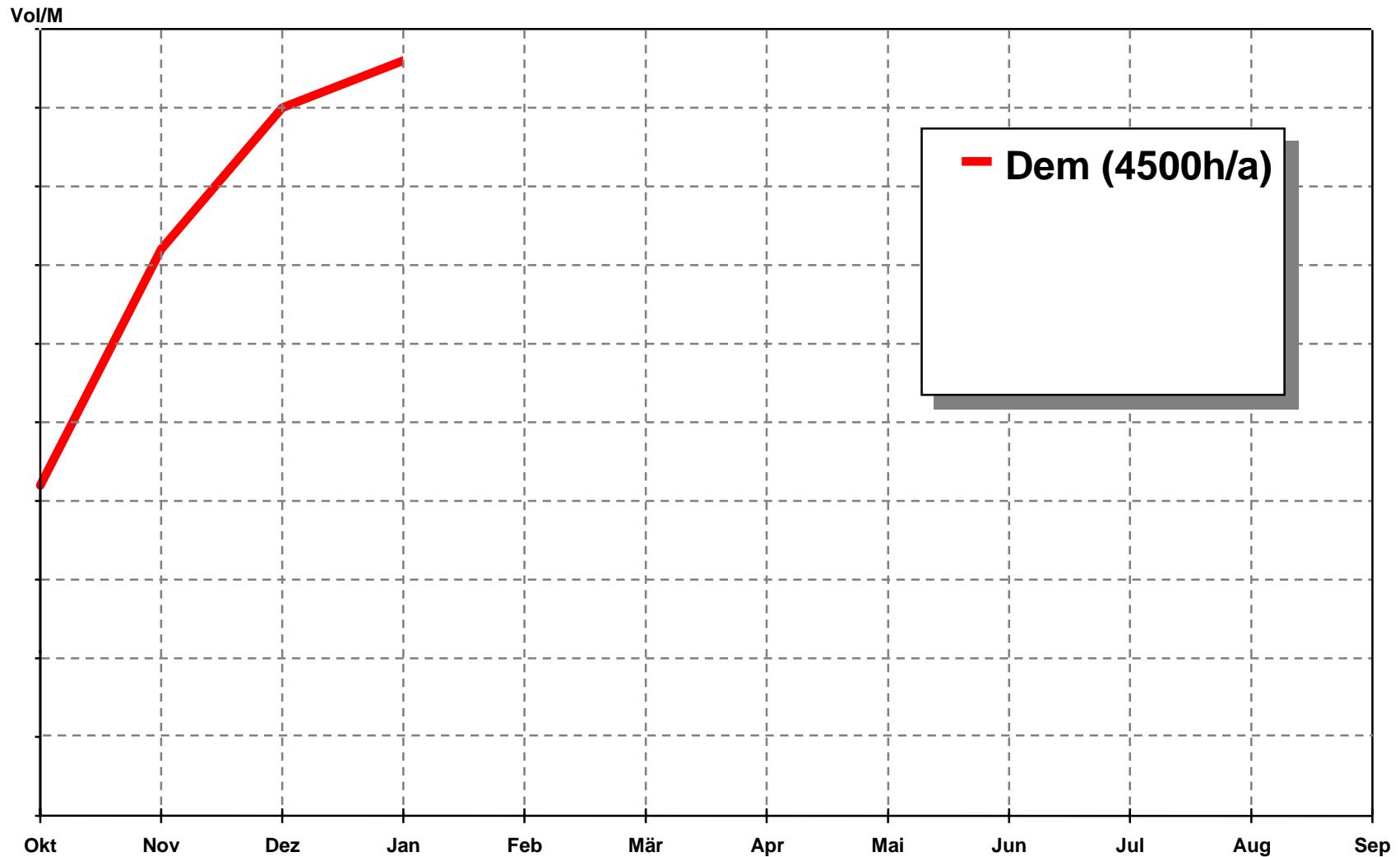
H² applications / optimization

- ❖ load balancing
- ❖ bin packing
- ❖ demand/supply balancing
- ❖ forecasting



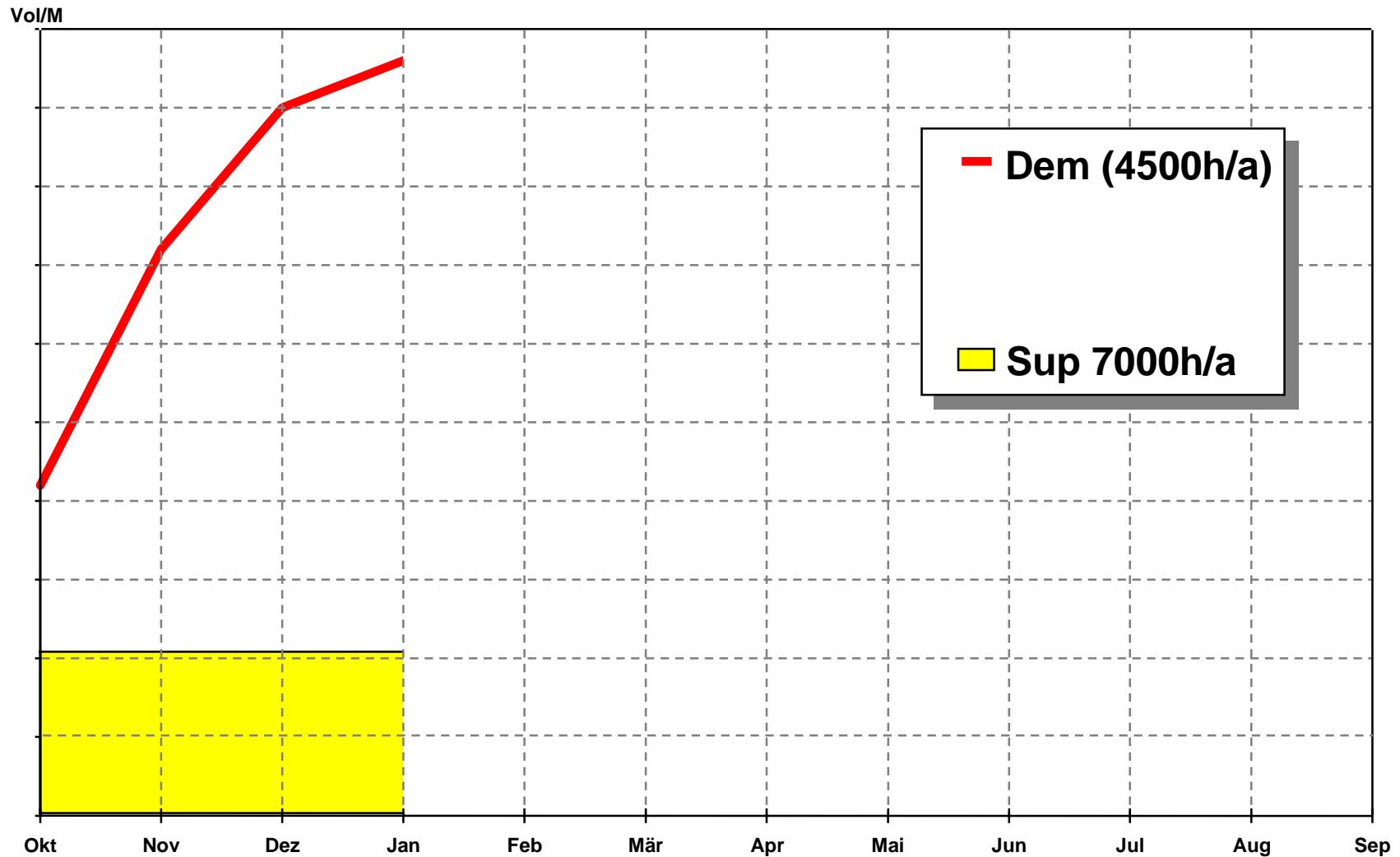
Applications of Quasitopos Axioms in Optimization

demand/supply balancing



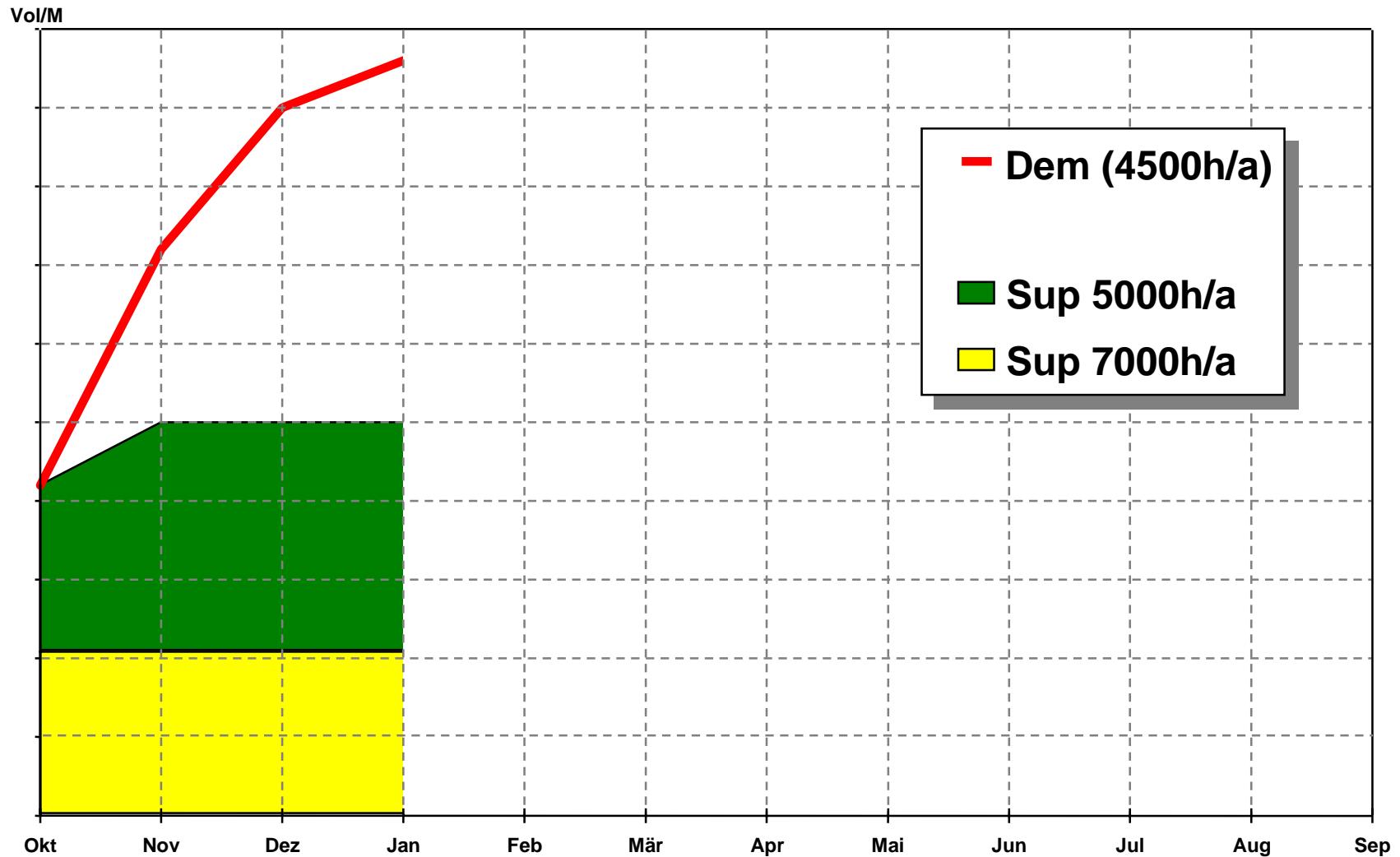
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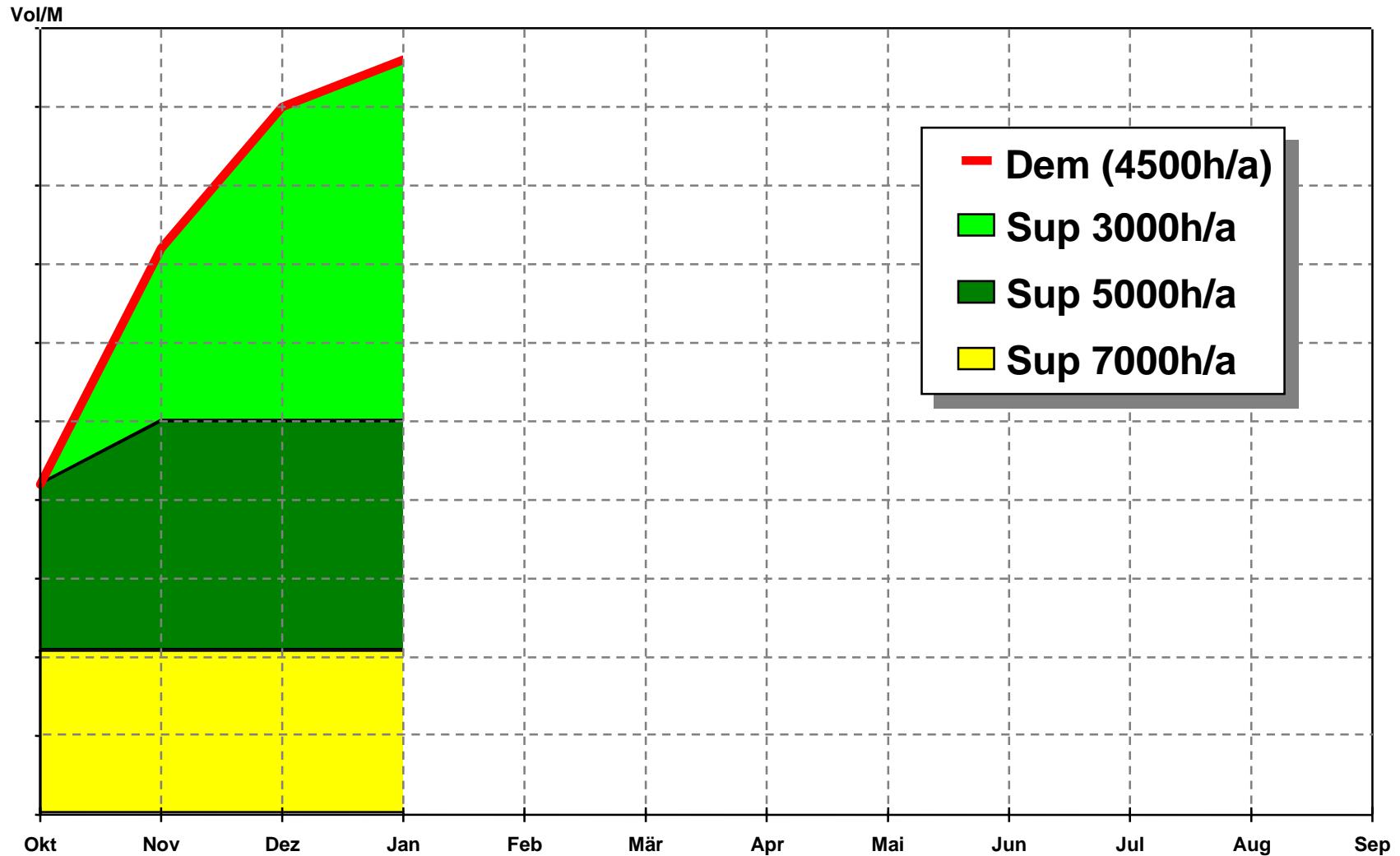
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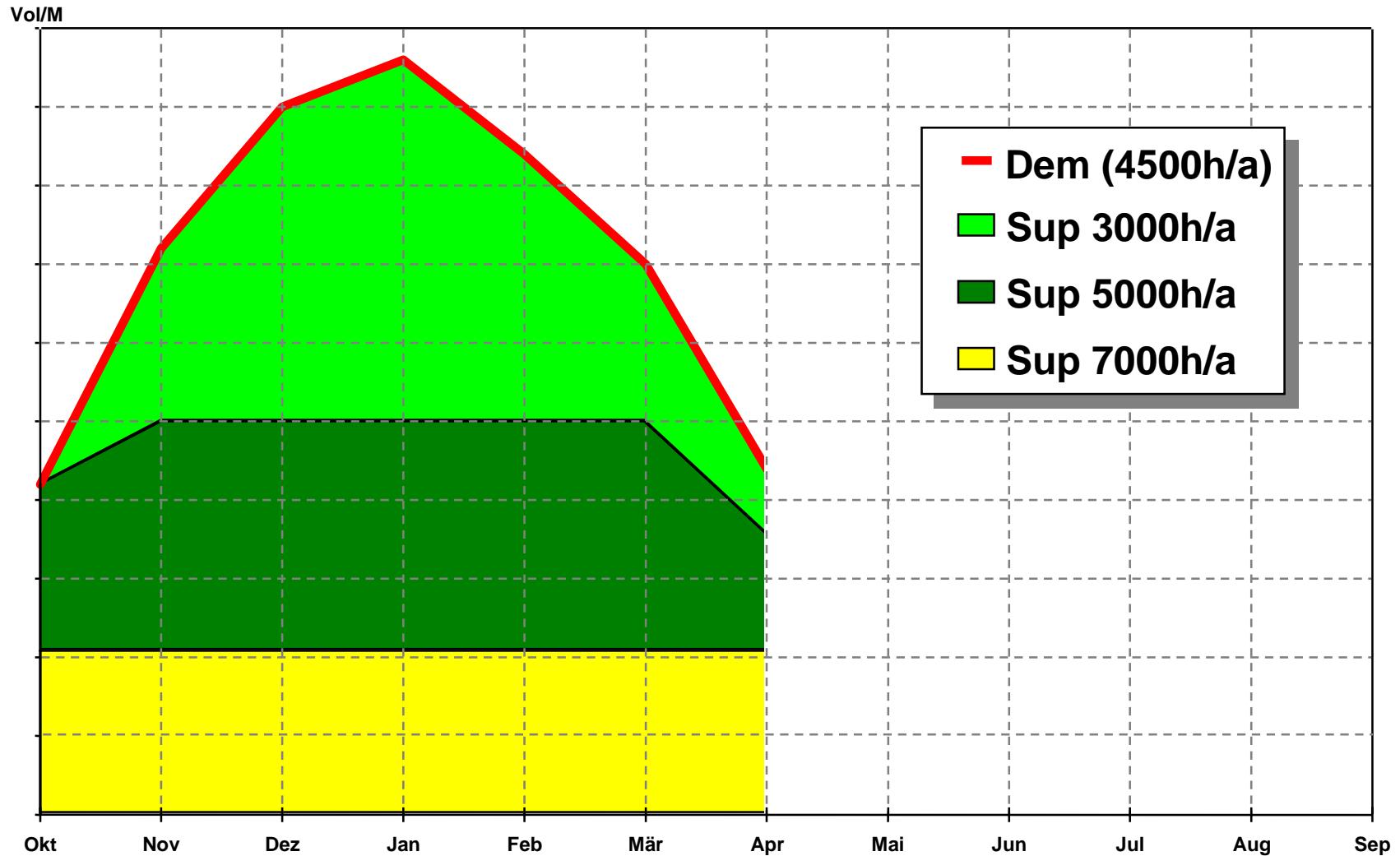
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demand/supply balancing

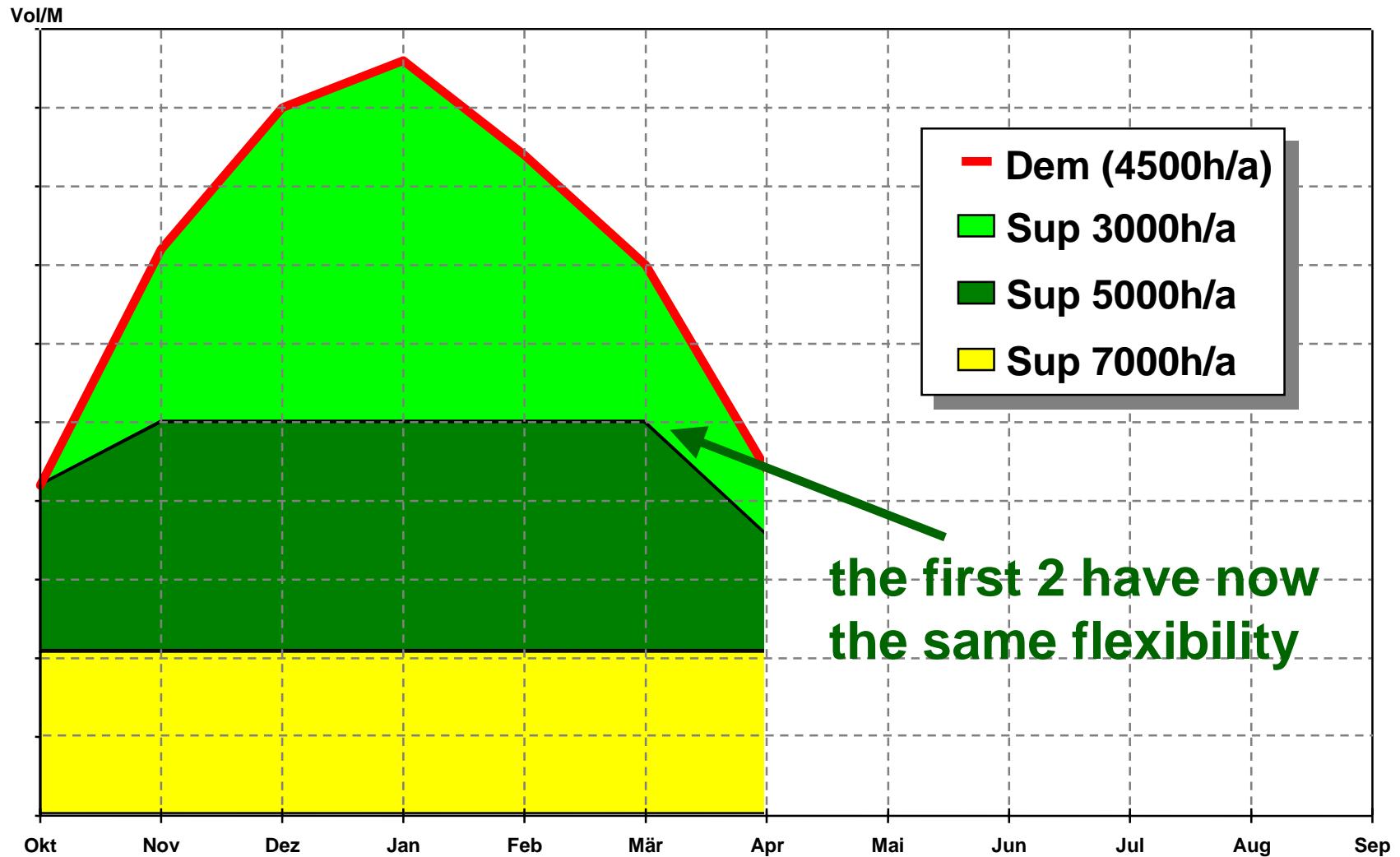


Applications of Quasitopos Axioms in Optimization

demand/supply balancing

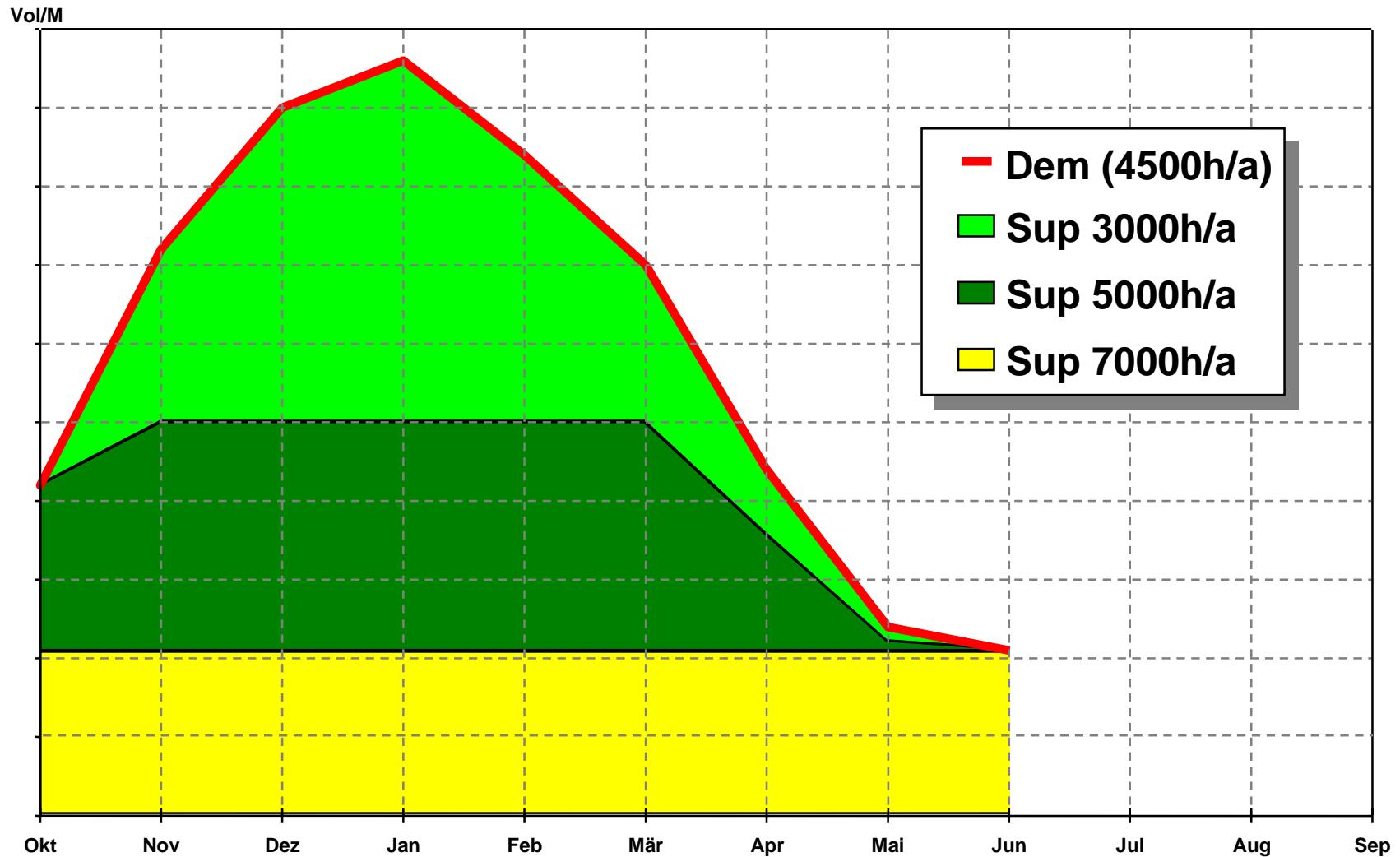


demand/supply balancing



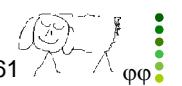
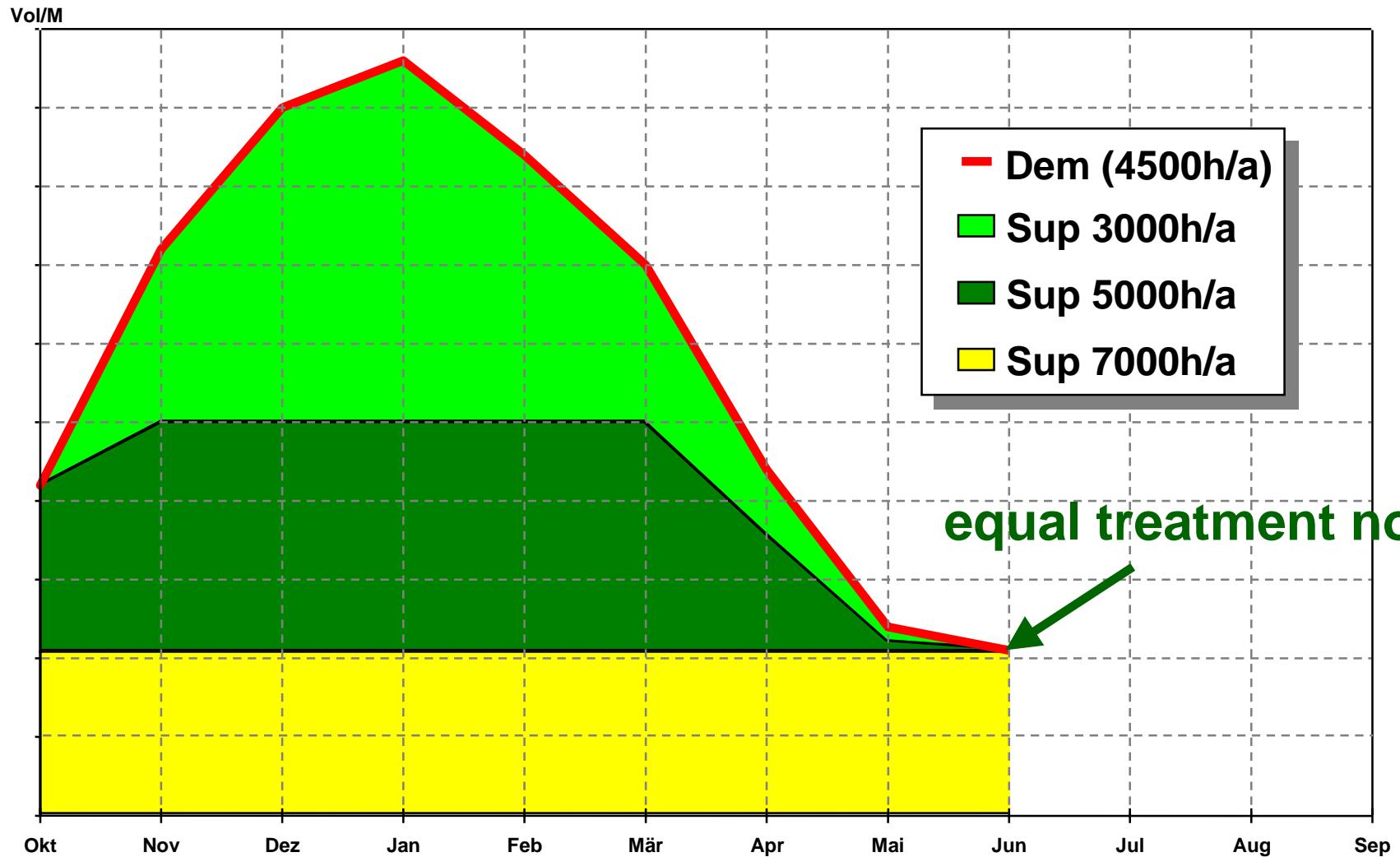
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demand/supply balancing

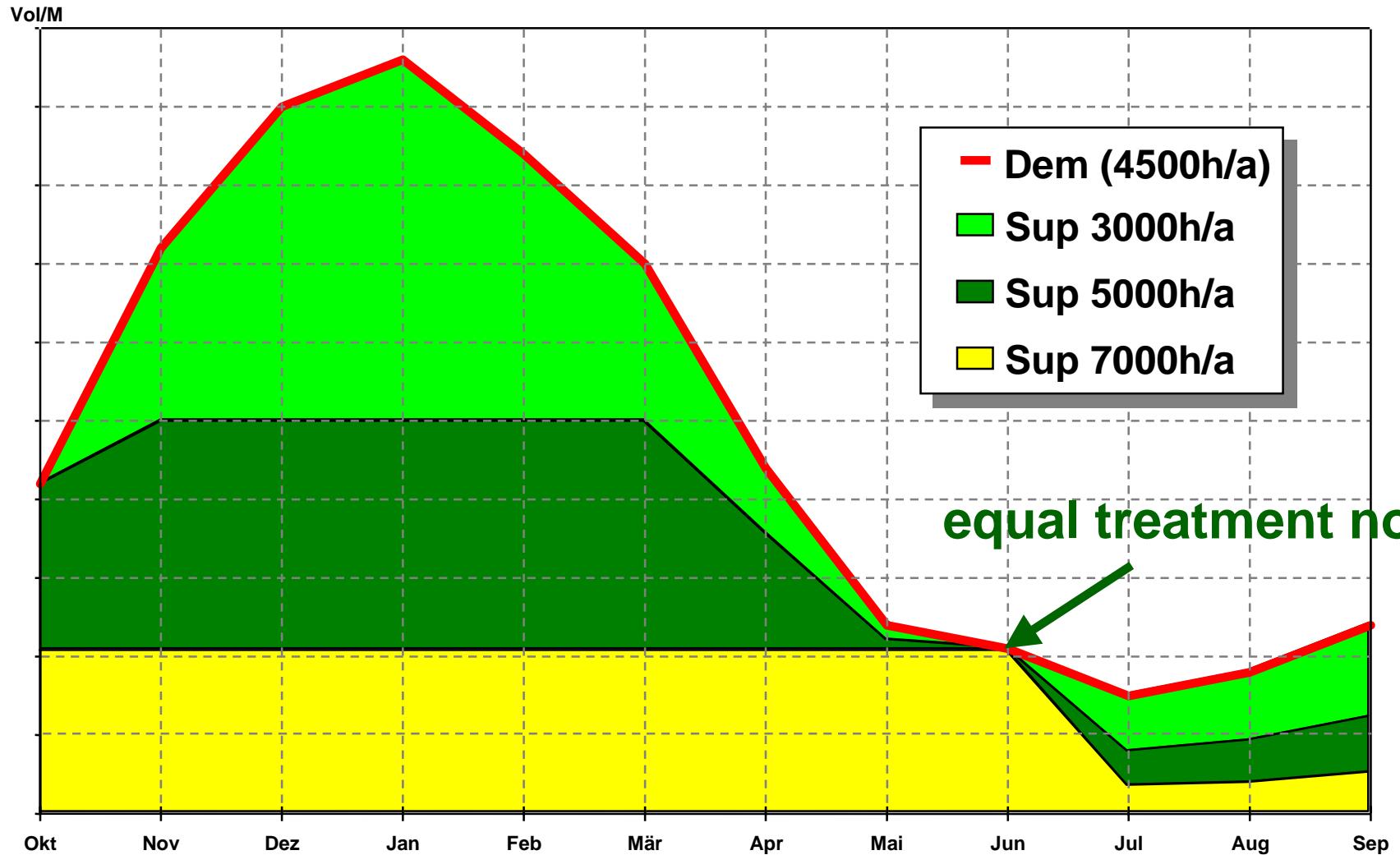


Applications of Quasitopos Axioms in Optimization

demand/supply balancing

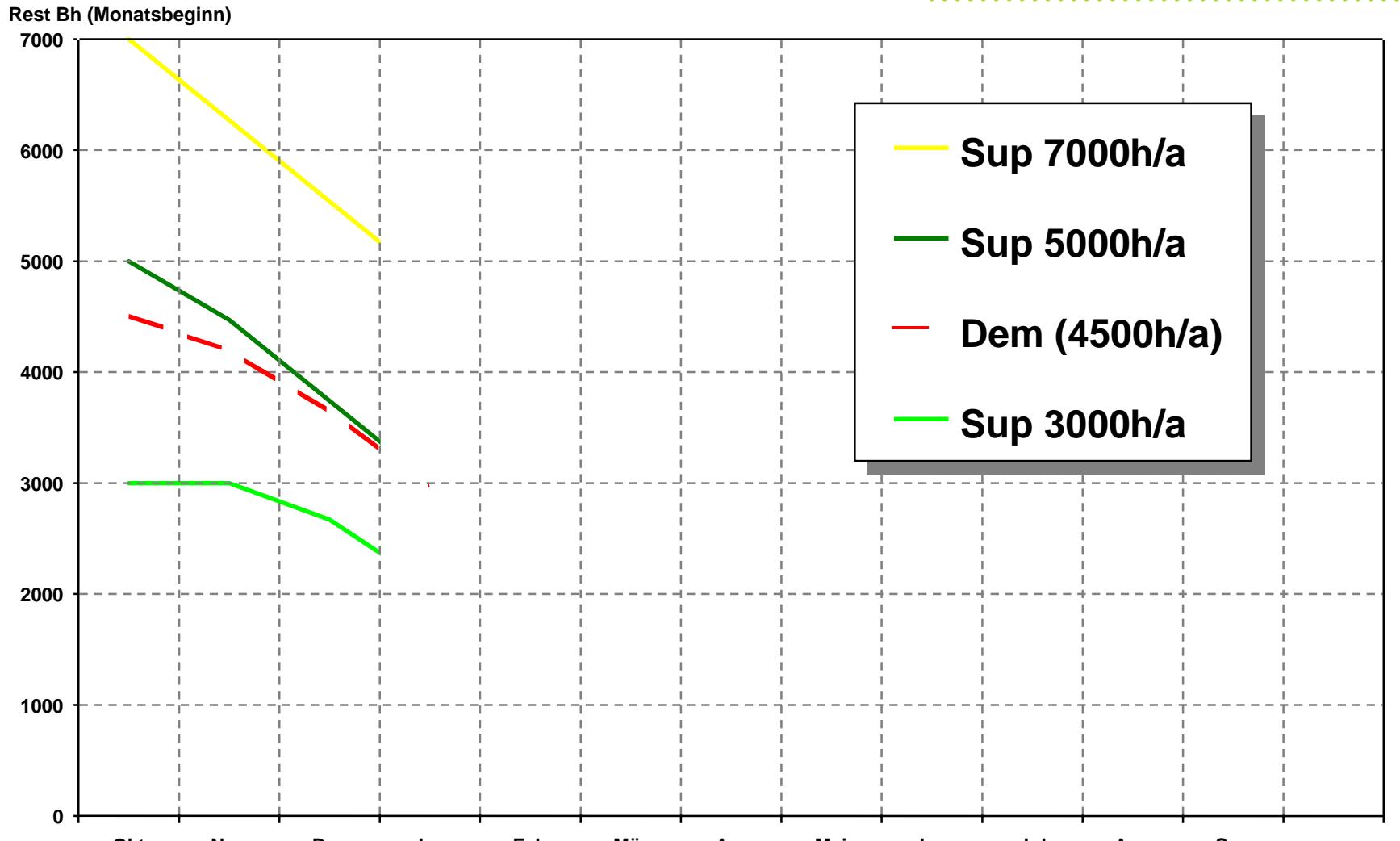


demand/supply balancing



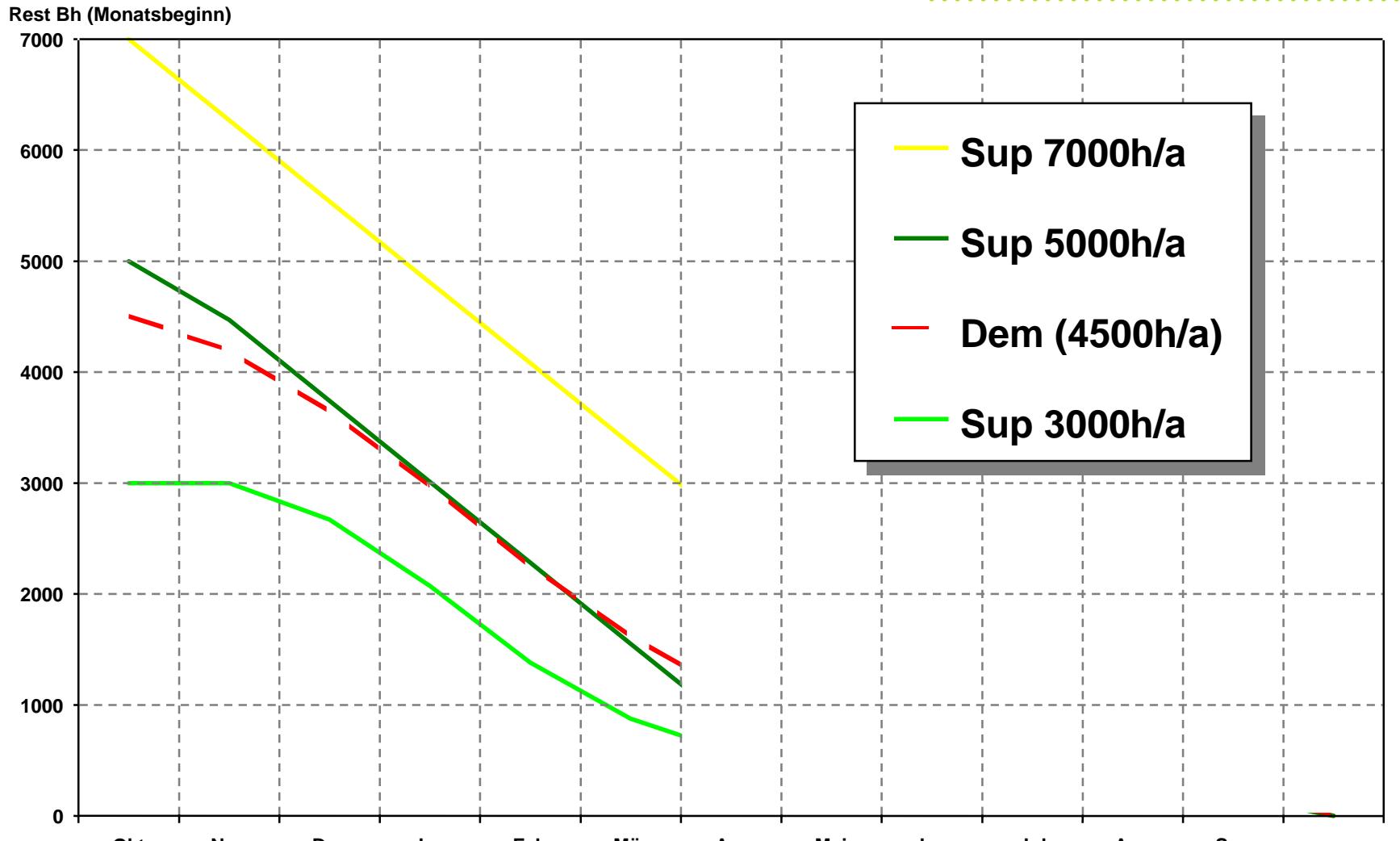
Applications of Quasitopos Axioms in Optimization

equal treatment as soon as possible

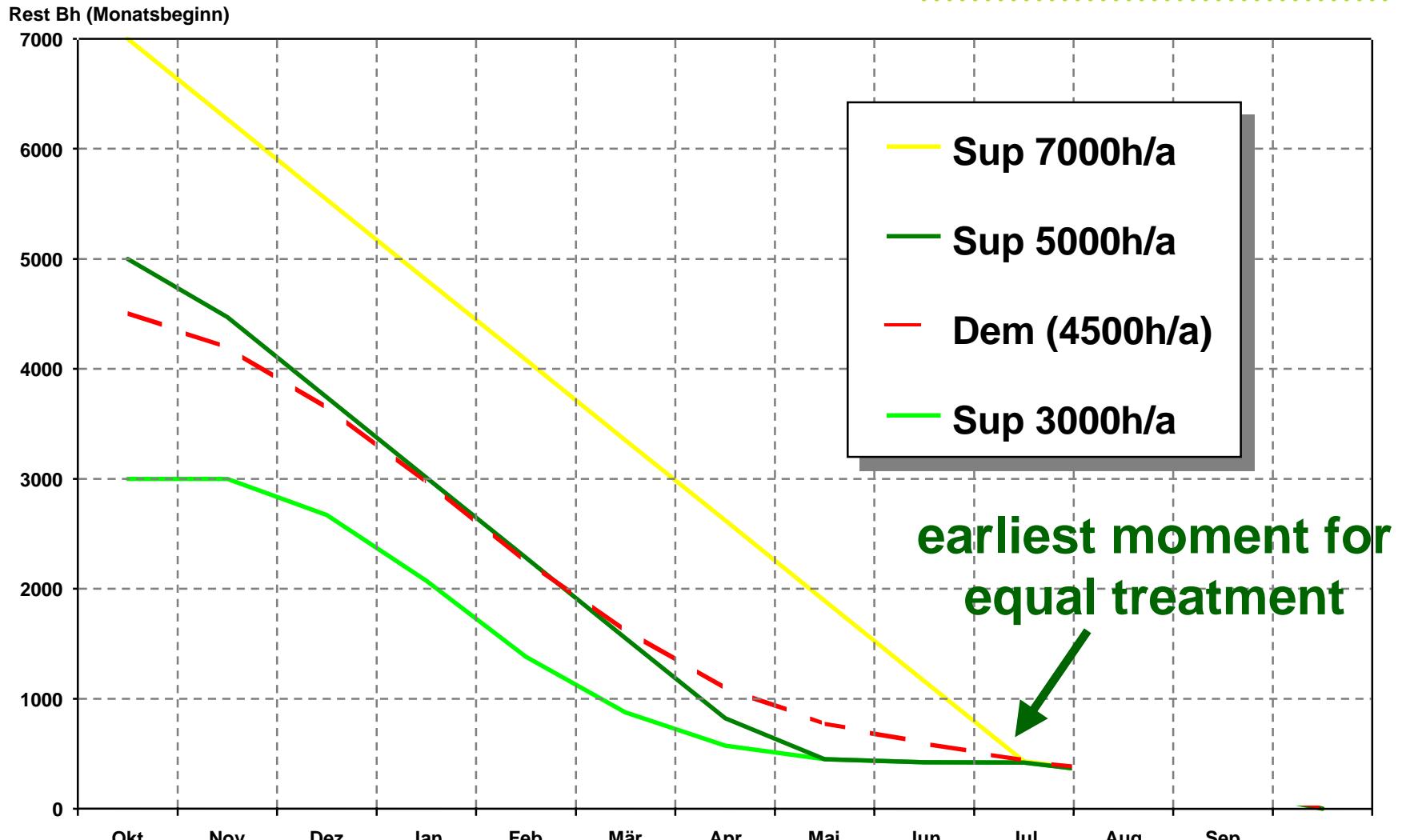


Applications of Quasitopos Axioms in Optimization

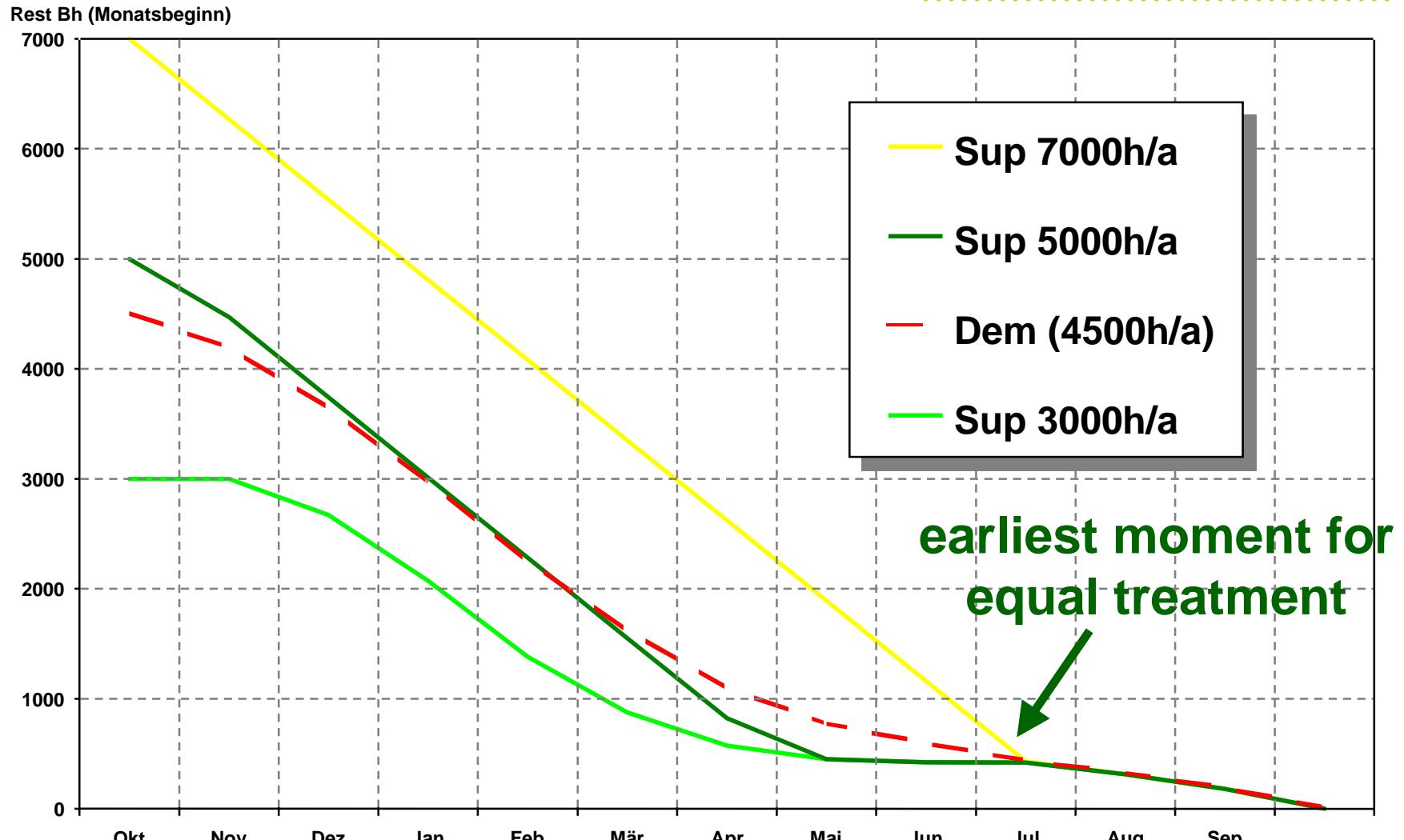
equal treatment as soon as possible



equal treatment as soon as possible



equal treatment as soon as possible



H² category theory

- ❖ topological categories
- ❖ quasitopoi

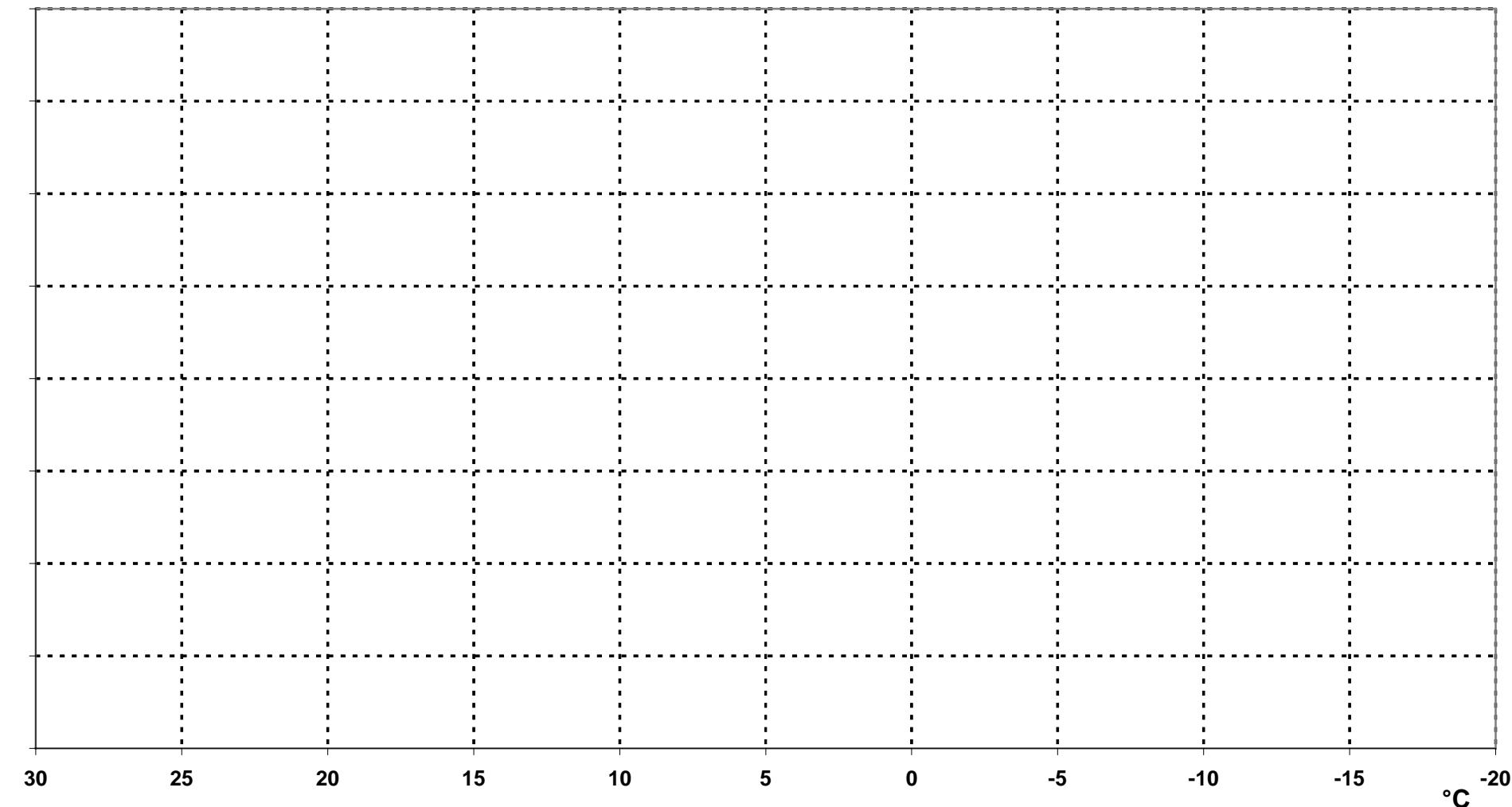
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- ❖ bin packing
- ❖ demand/supply balancing
- ❖ forecasting



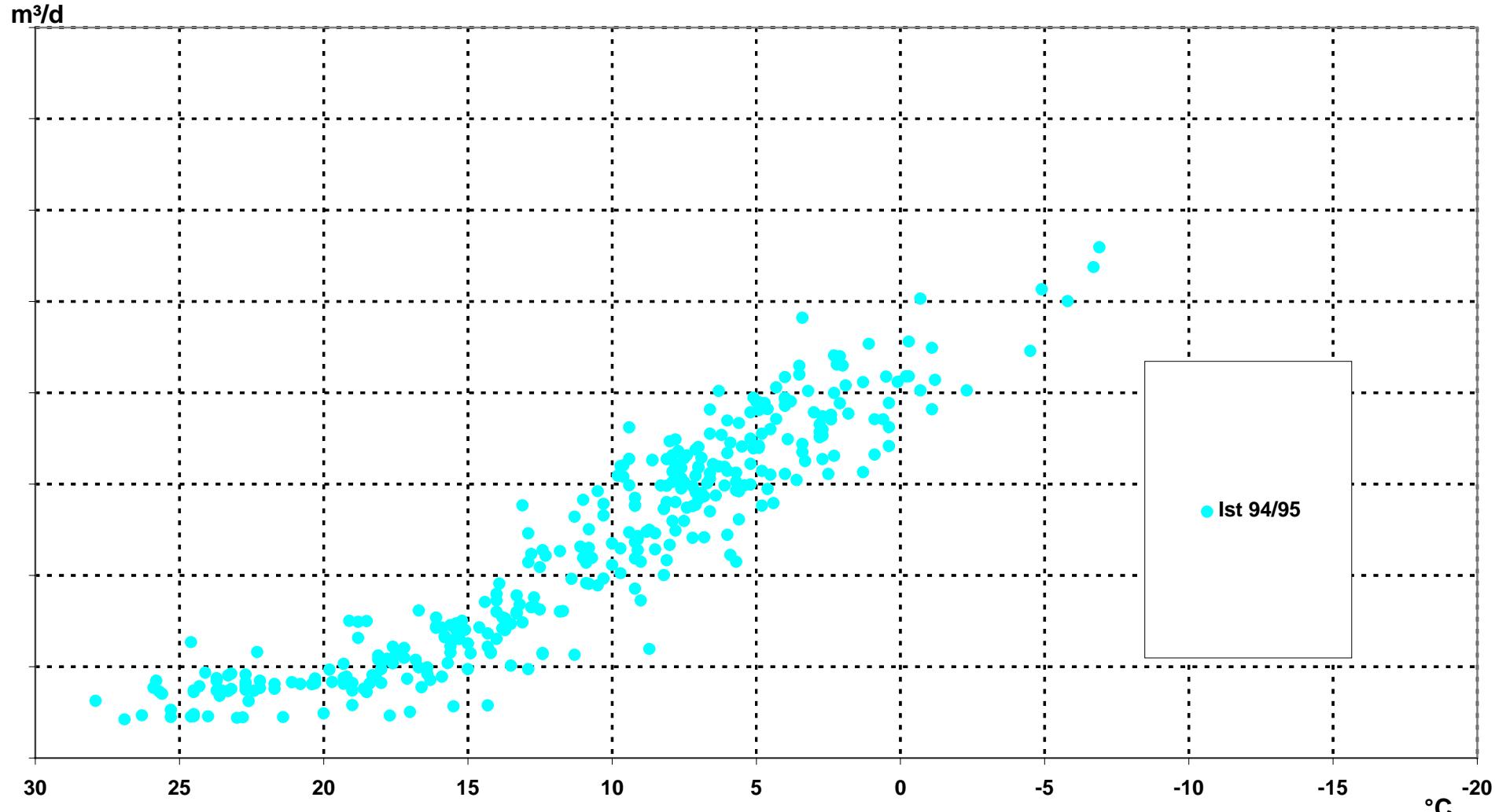
Applications of Quasitopos Axioms in Optimization

forecasting energy over temperature



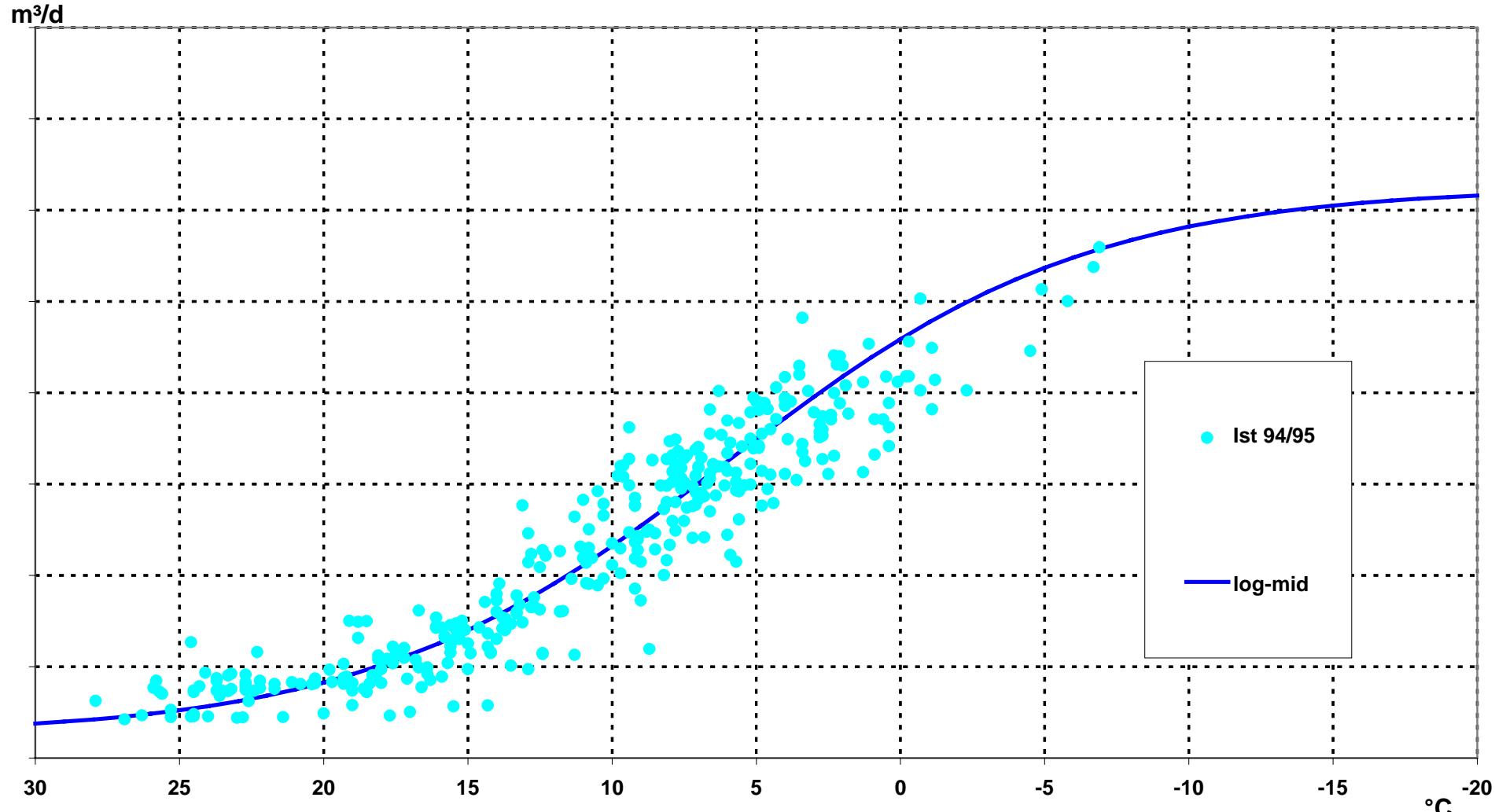
Applications of Quasitopos Axioms in Optimization

forecasting energy over temperature



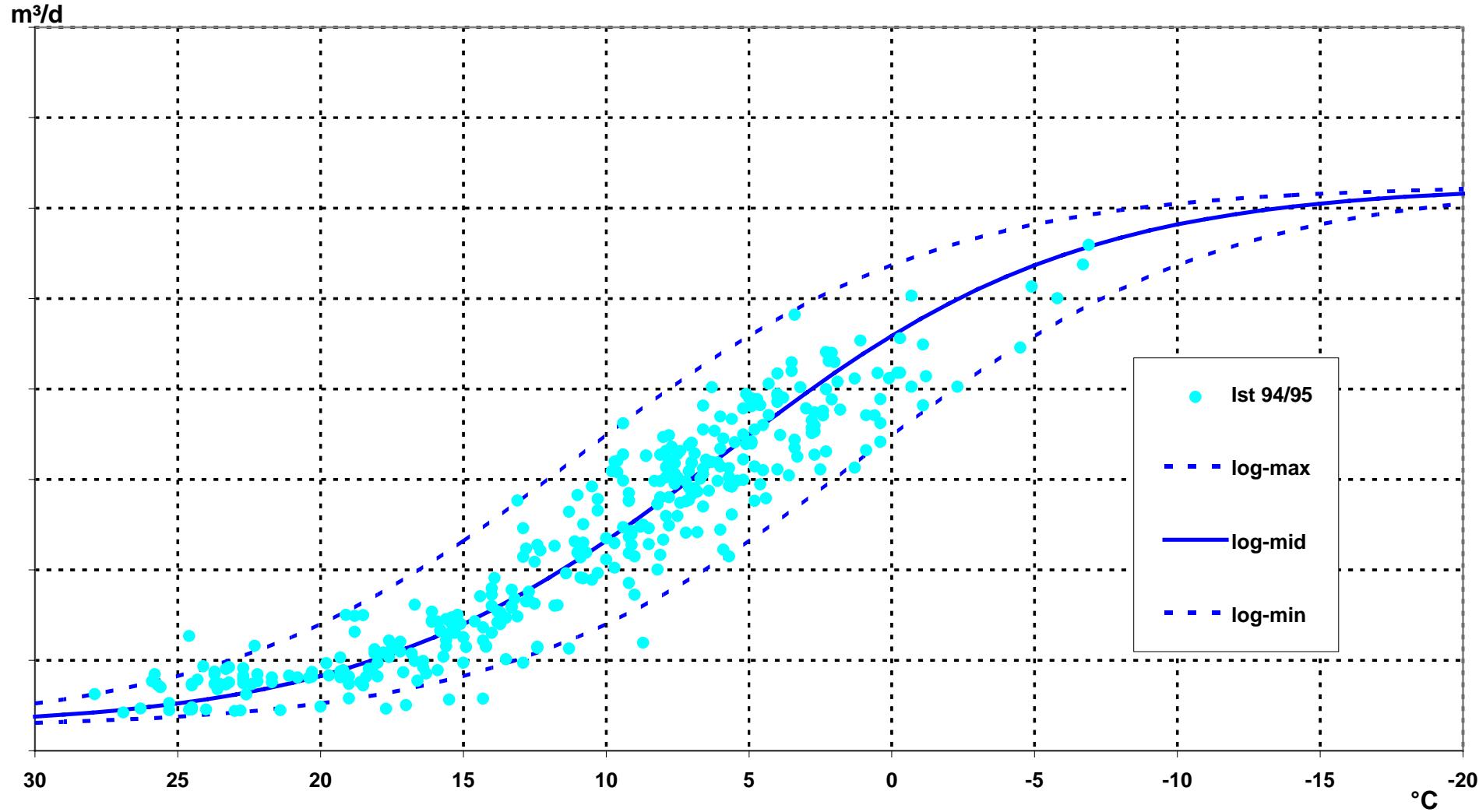
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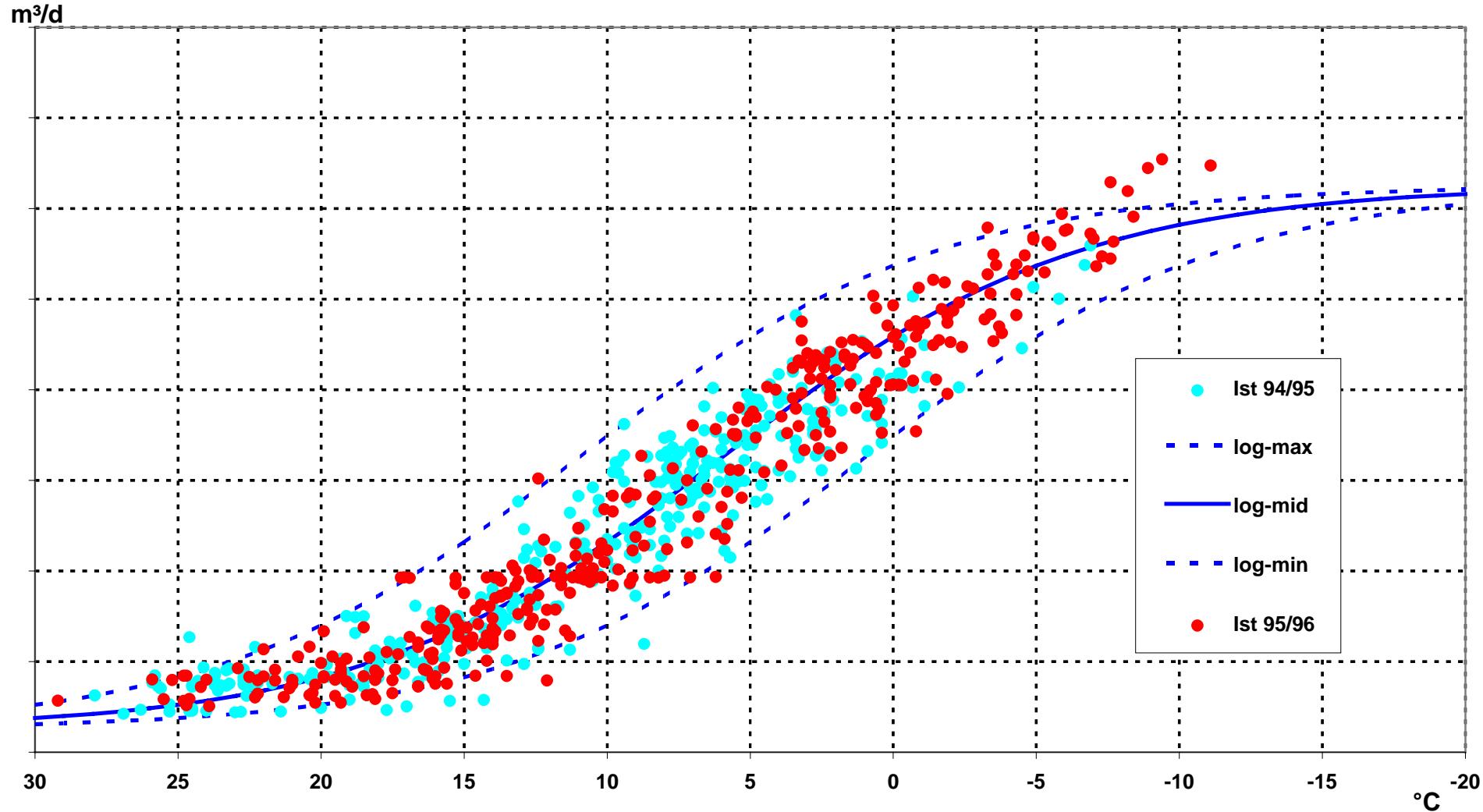
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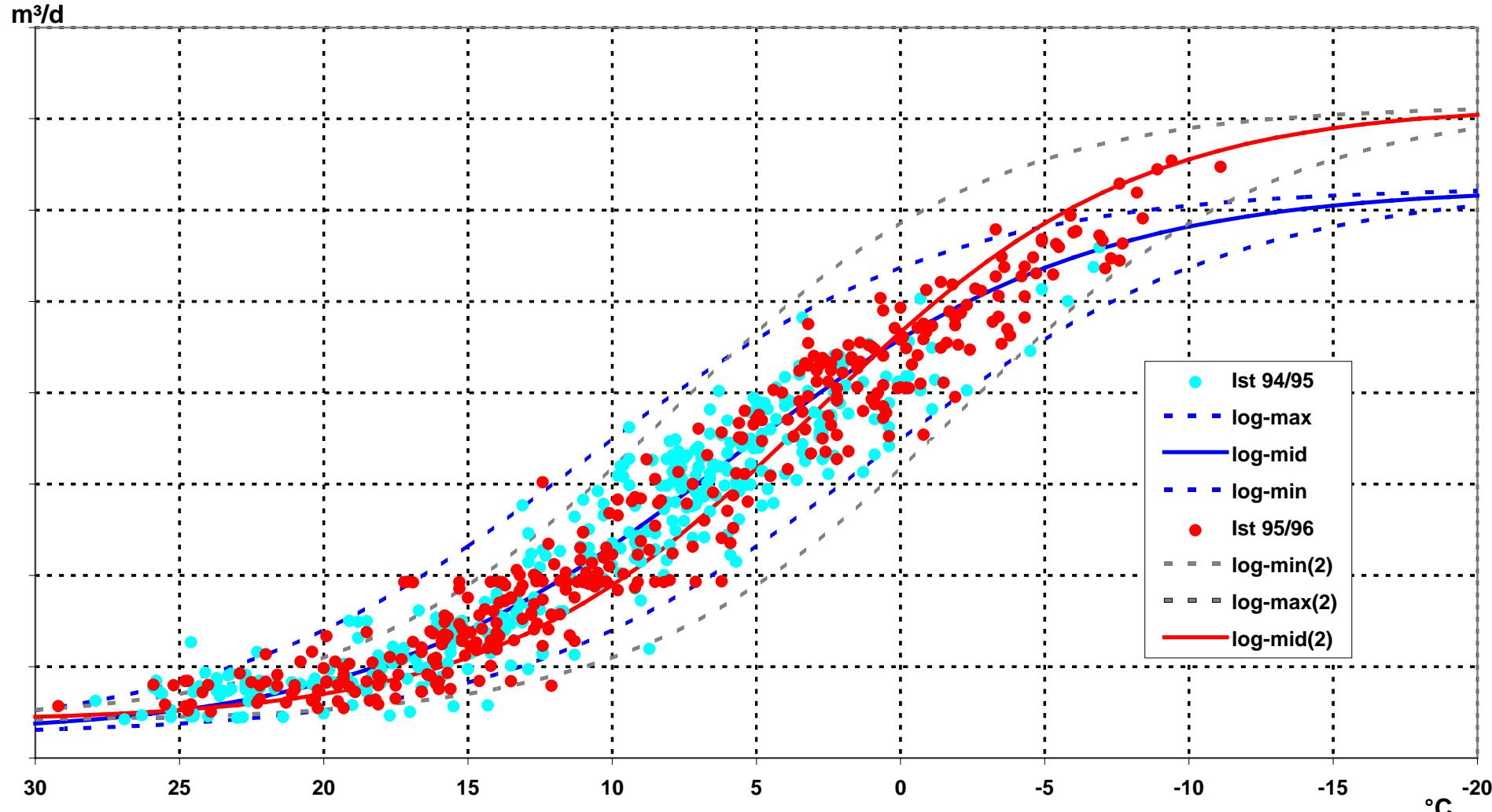


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forecasting energy over temperature

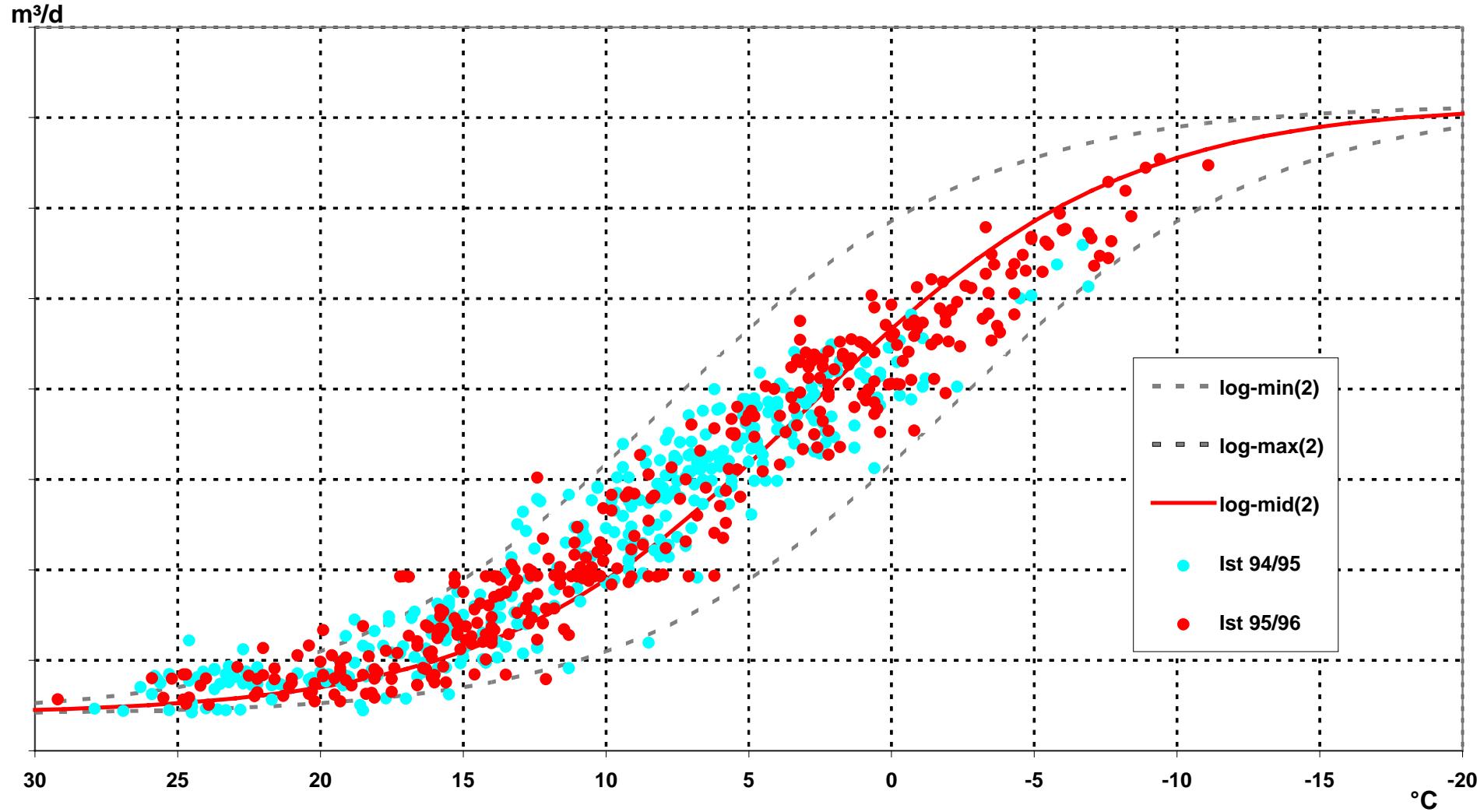


forecasting energy over temperature

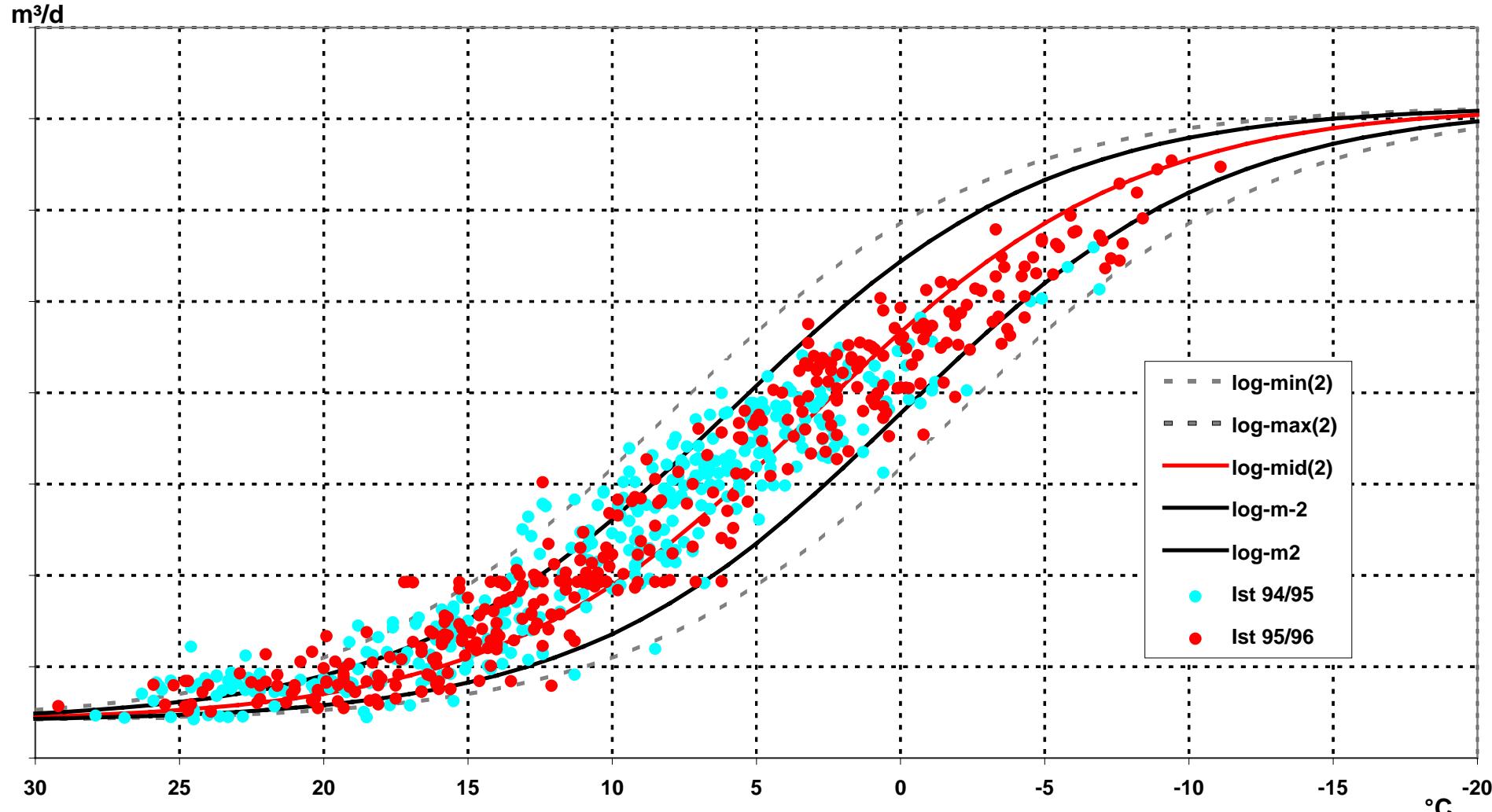


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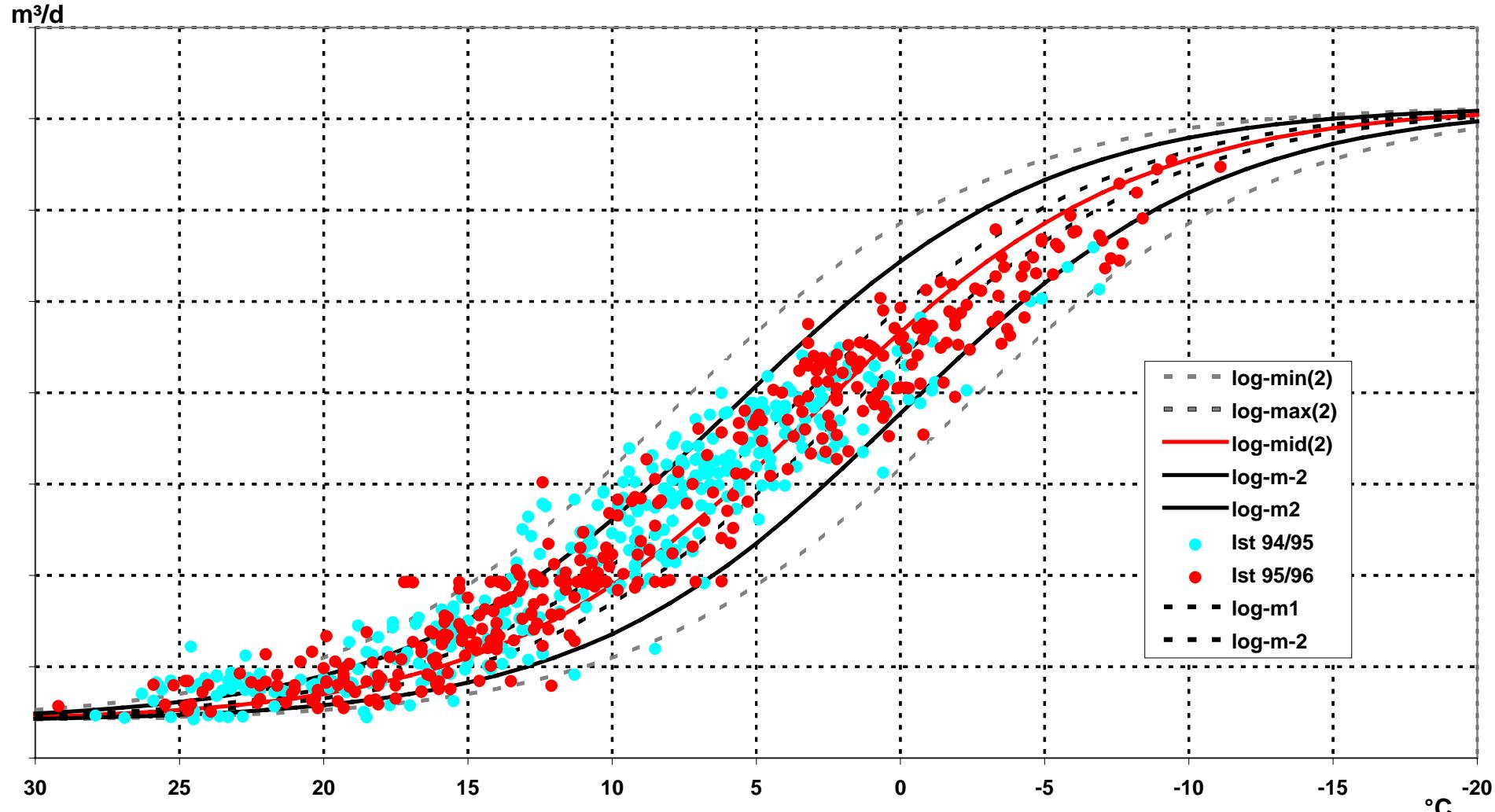


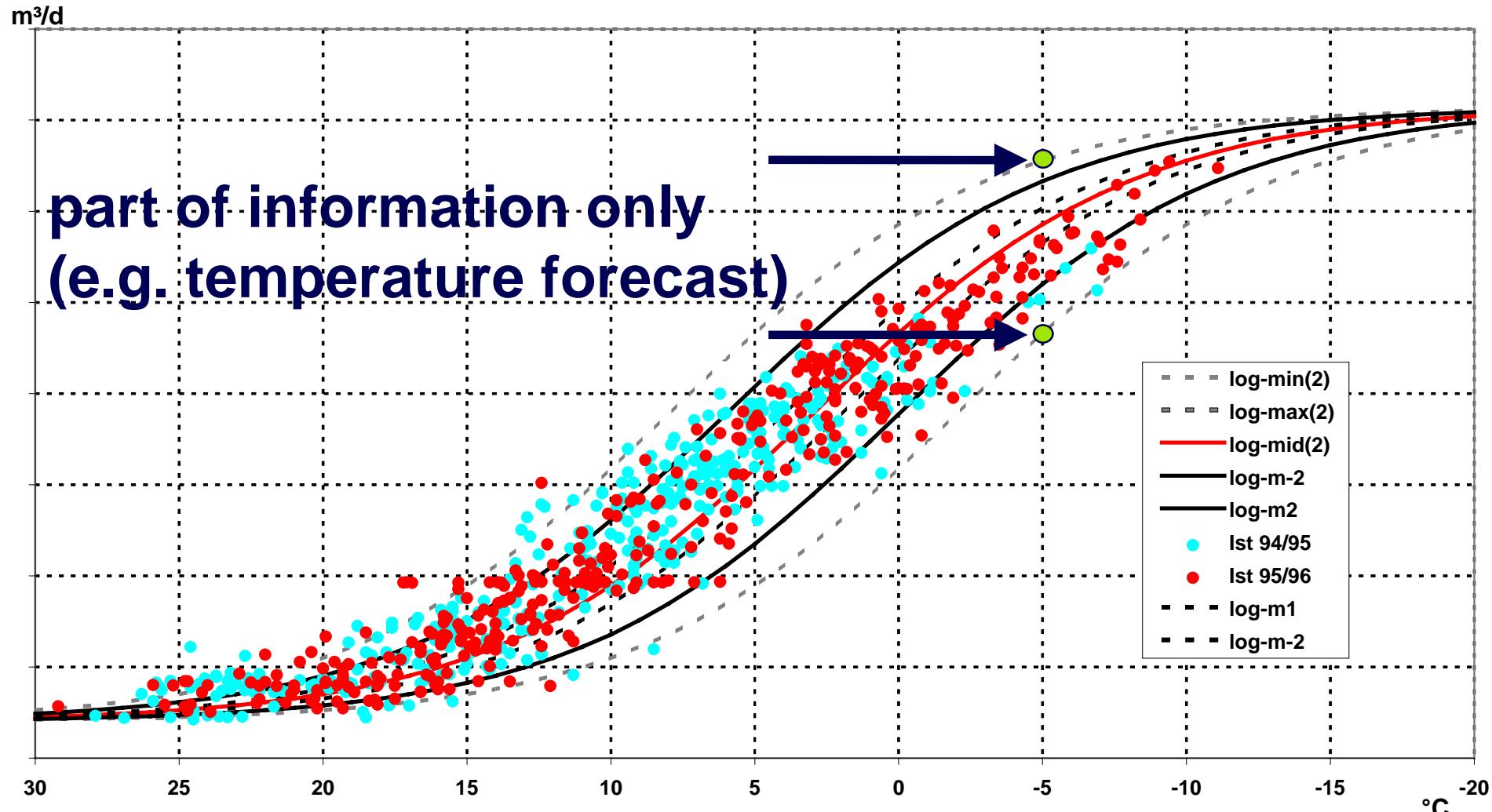
forecasting energy over temperature



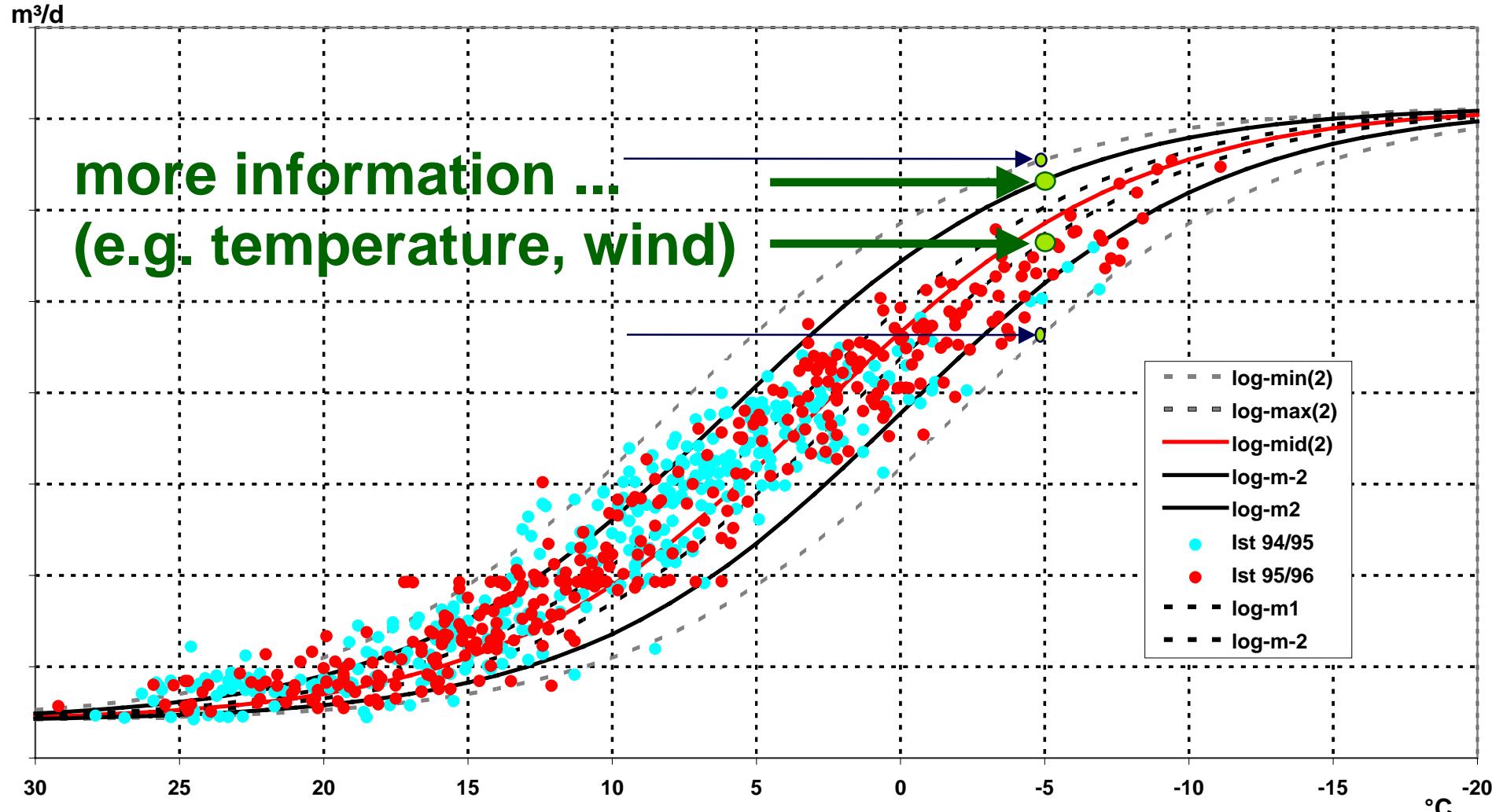
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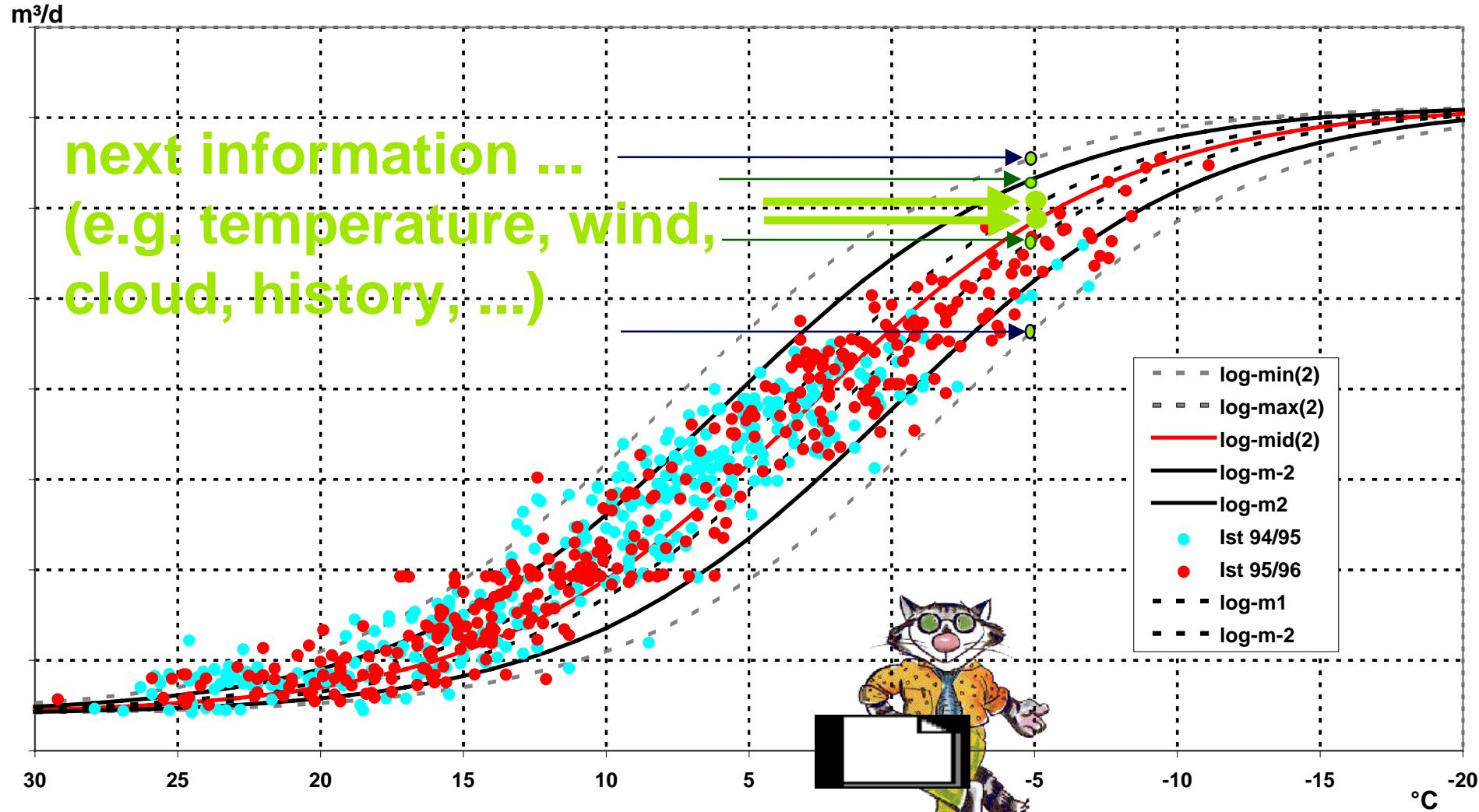




forecasting energy over temperature



forecasting energy over temperature



... thank you
for your
kind
attention ...

