ProdRisk experiences

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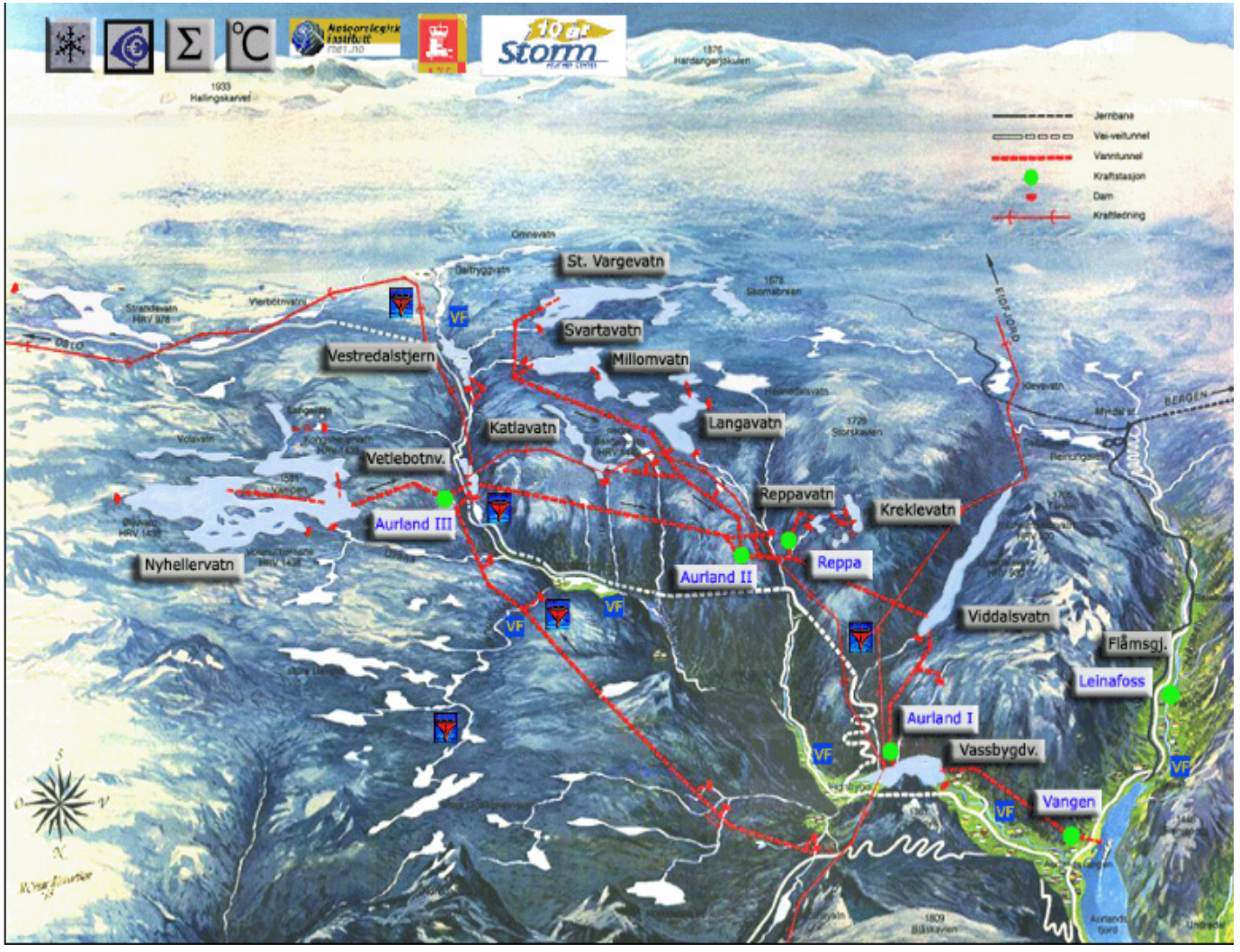
Agenda

- Model comparison
- Pumping case
- Issues
- User interface

Model comparison

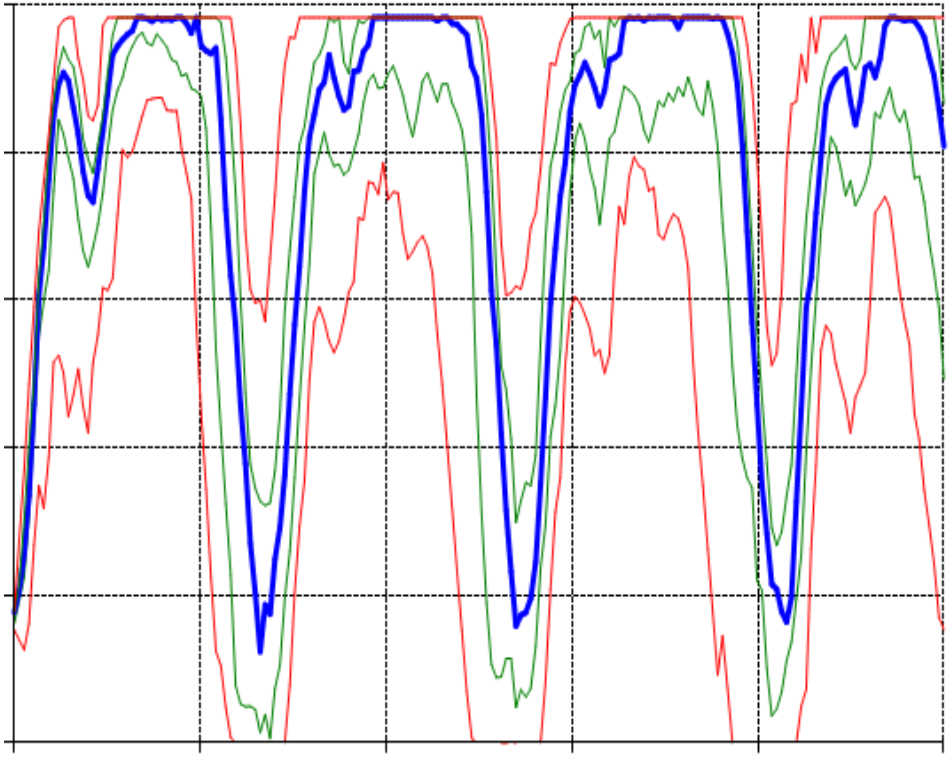
- ProdRisk normal mode
- ProdRisk NOHEAD option
- EOPS (VANSIMTAP)

- River system: Aurland

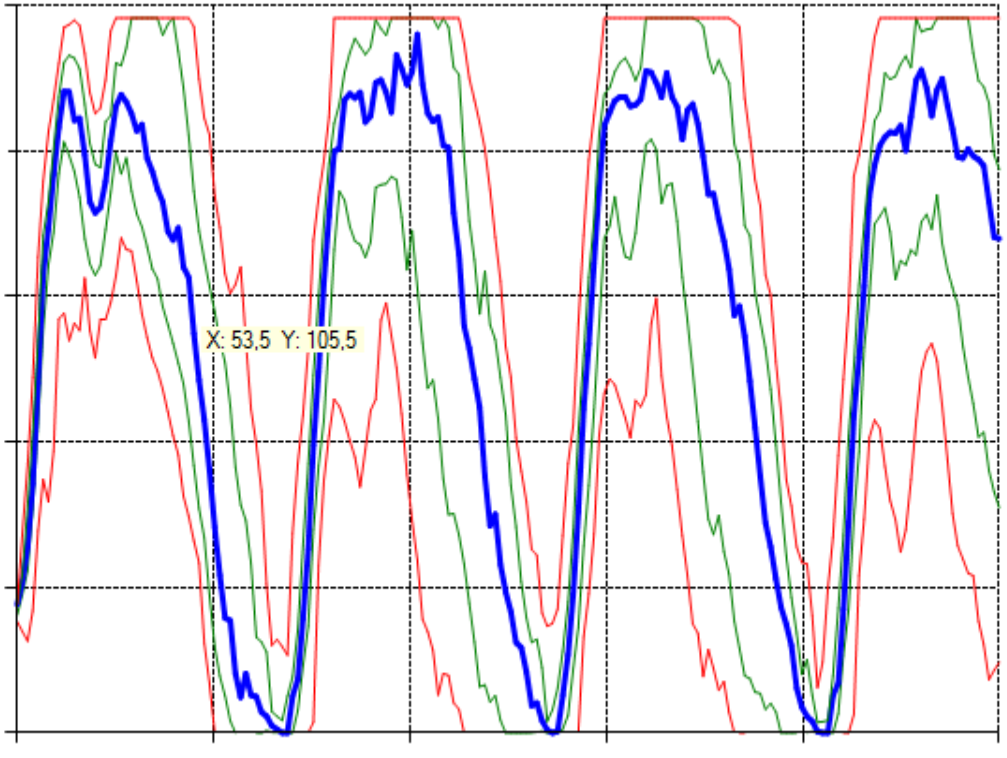


Model comparison

Head

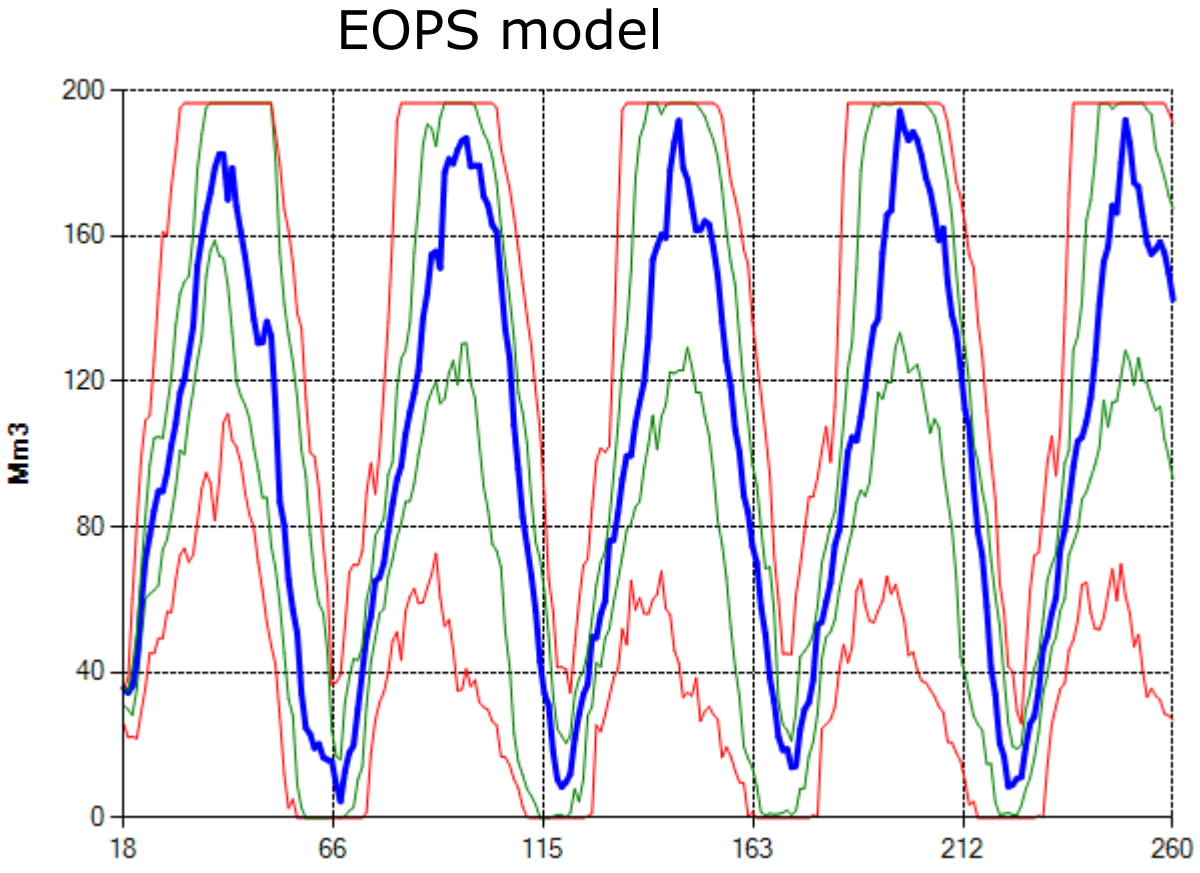


No Head

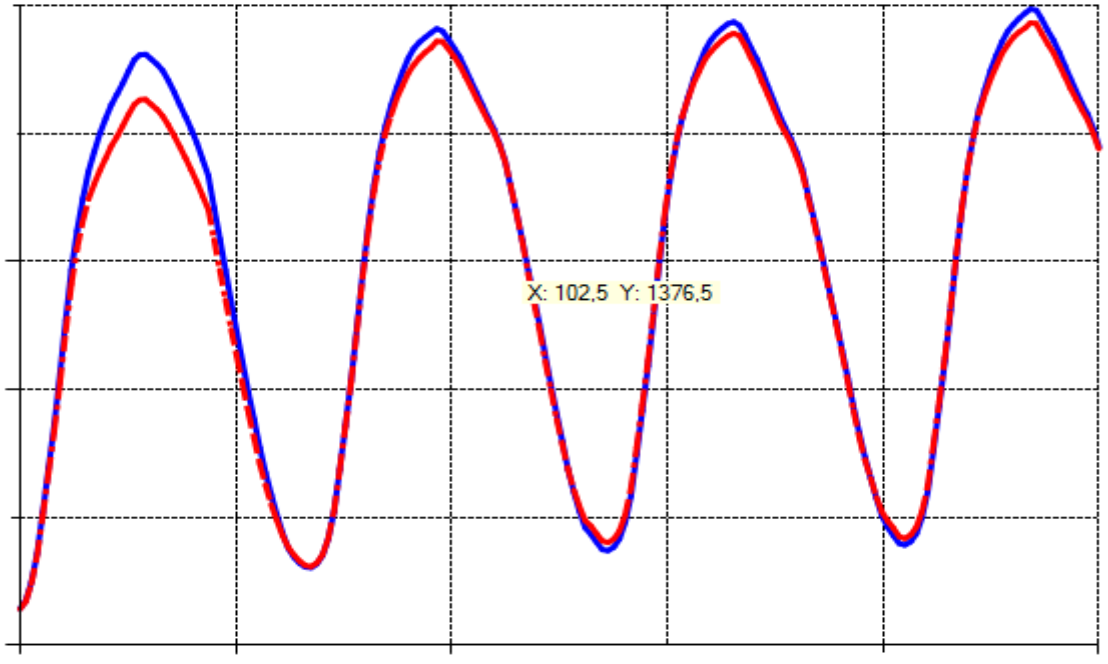


Reservoir with high energy conversion factor

EOPS reference simulation



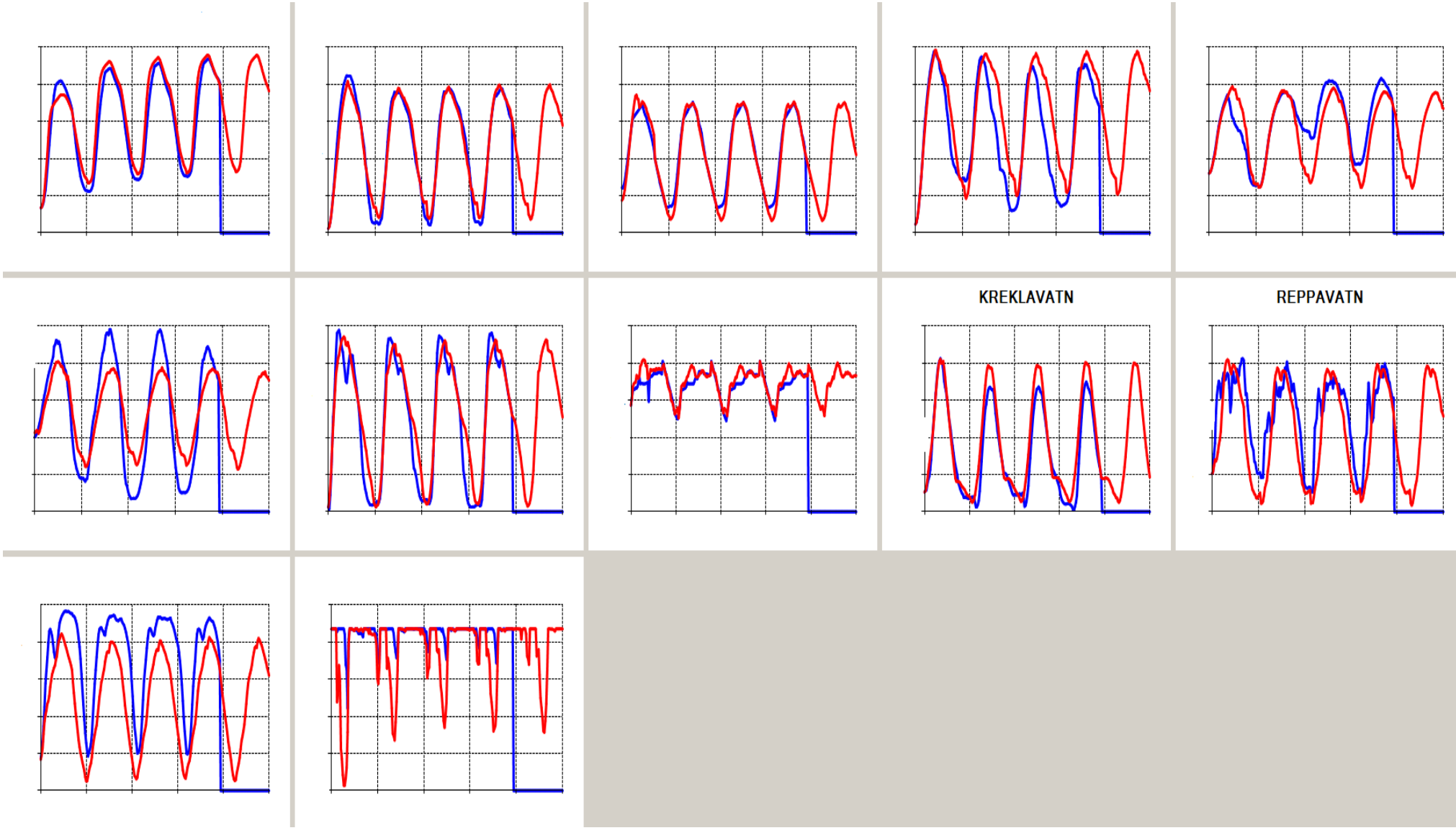
Average reservoir for the total system.



Red = EOPS, BLUE=ProdRisk

- Quite similar pattern for the far end.

ProdRisk vs. EOPS



•The distribution among single reservoirs, on the other hand, is quite different.

Delta Production – 4 years period

Values in GWh

	NO HEAD-HEAD	EOPS-HEAD
Summer	-38	260
Winter	-100	-414
Pumping	74	50
Reservoir change	11	-38
Total	**-53**	**-141**

ProdRisk vs. EOPS income – 4 years period

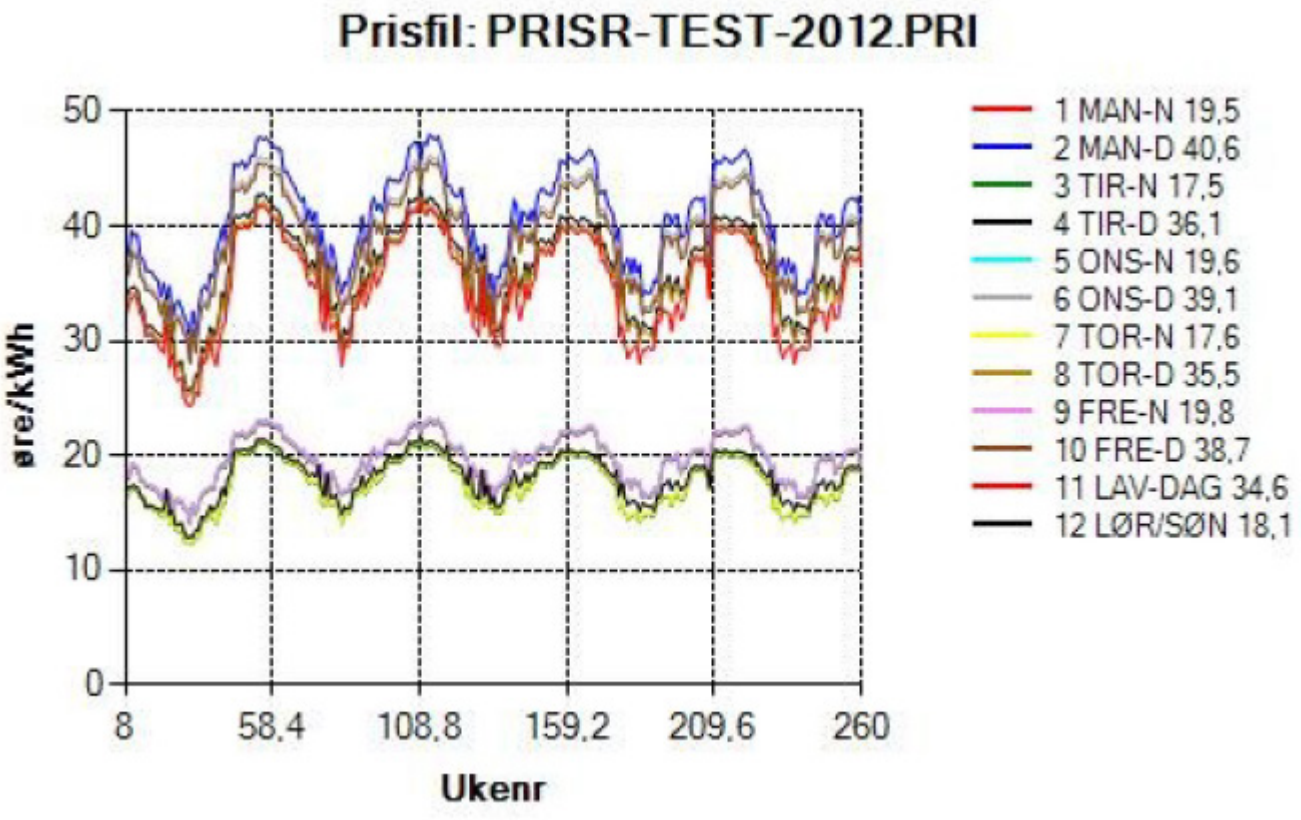
Values in Mill.NOK

	NO HEAD-HEAD	EOPS-HEAD
Summer	8	-64
Winter	31	132
Pumping	-16	-15
Reservoir change	-4	12
Total	**19**	**65**

Water Values

	PR HEAD - PR NOHEAD	PR HEAD - EOPS
NYHELLERVATN	-2,5	4,1
KATLAVATN	1,1	2,4
MILLOMVATN	-5,8	46,0
VARGEVATN	5,2	6,3
LANGAVATN	4,8	4,6
SVARTAVATN	3,6	5,3
AURLAND II H	-	-
VESTREDALSTJ	-0,9	9,1
VESLEBOTN	-0,8	3,9
KREKLEVATN	50,0	134,2
REPPVATN	3,3	34,9
VIDDALSVATN	-0,4	-1,0
VASSBYGDVATN	0,0	0,0

Pumping Case: Behavior with large price spreads



Difference between ProdRisk and EOPS

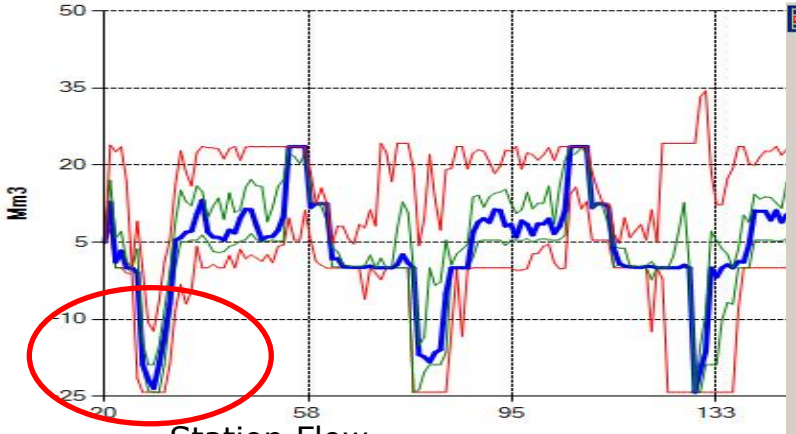
	Summer [MKR]	Winter [MKR]	Total [MKR]	Production [GWh]	Average price [Øre/kWh
Station A	3,5	27,3	30,8	72,1	0,7
Station B	8,8	2,9	11,7	31,8	0,2
Station C	1,3	0,2	1,5	0,8	0,7
Station D	0,8	-0,7	0,1	-0,6	0,9
Station E	8,6	5,8	14,4	-5,0	0,7
Station F	0,3	2,6	2,8	12,8	-1,8
Total	23,3	38,0	61,3	111,9	0,7
Pumping	1,3	0,0	1,3	9,5	-1,4
Reservior correction			-1,0		
Sum			61,7		

Issues

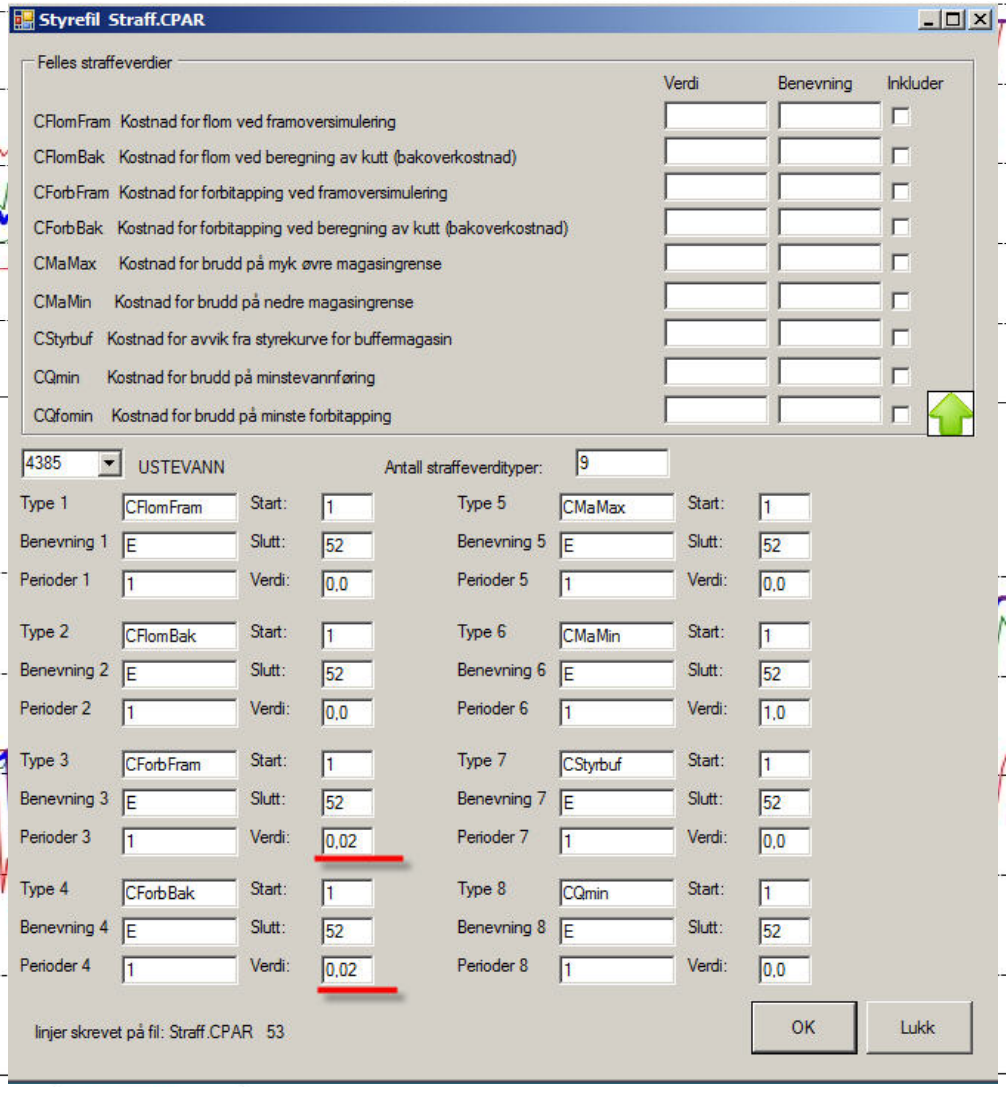
- Pumping
- Shop coupling
  - ➡ New Sintef Project
- Hydraulic coupling

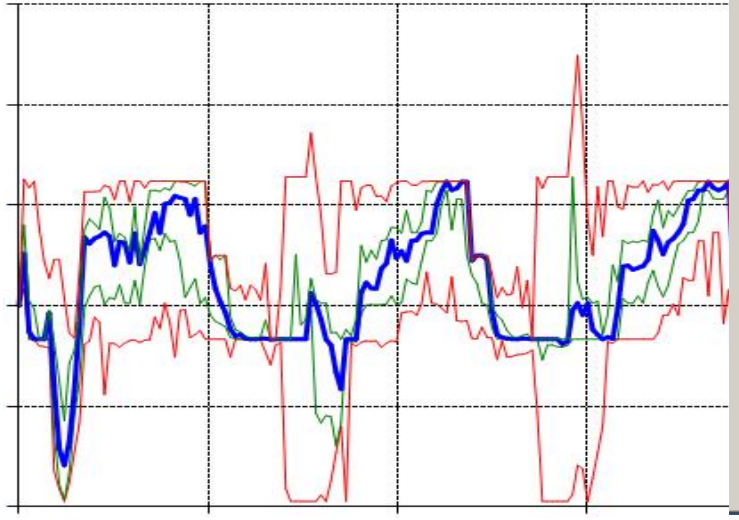
Hydraulic coupling – Weakness?

Head simulation

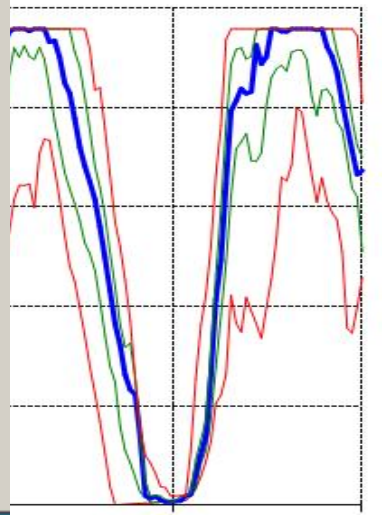


Station Flow





Station Flow

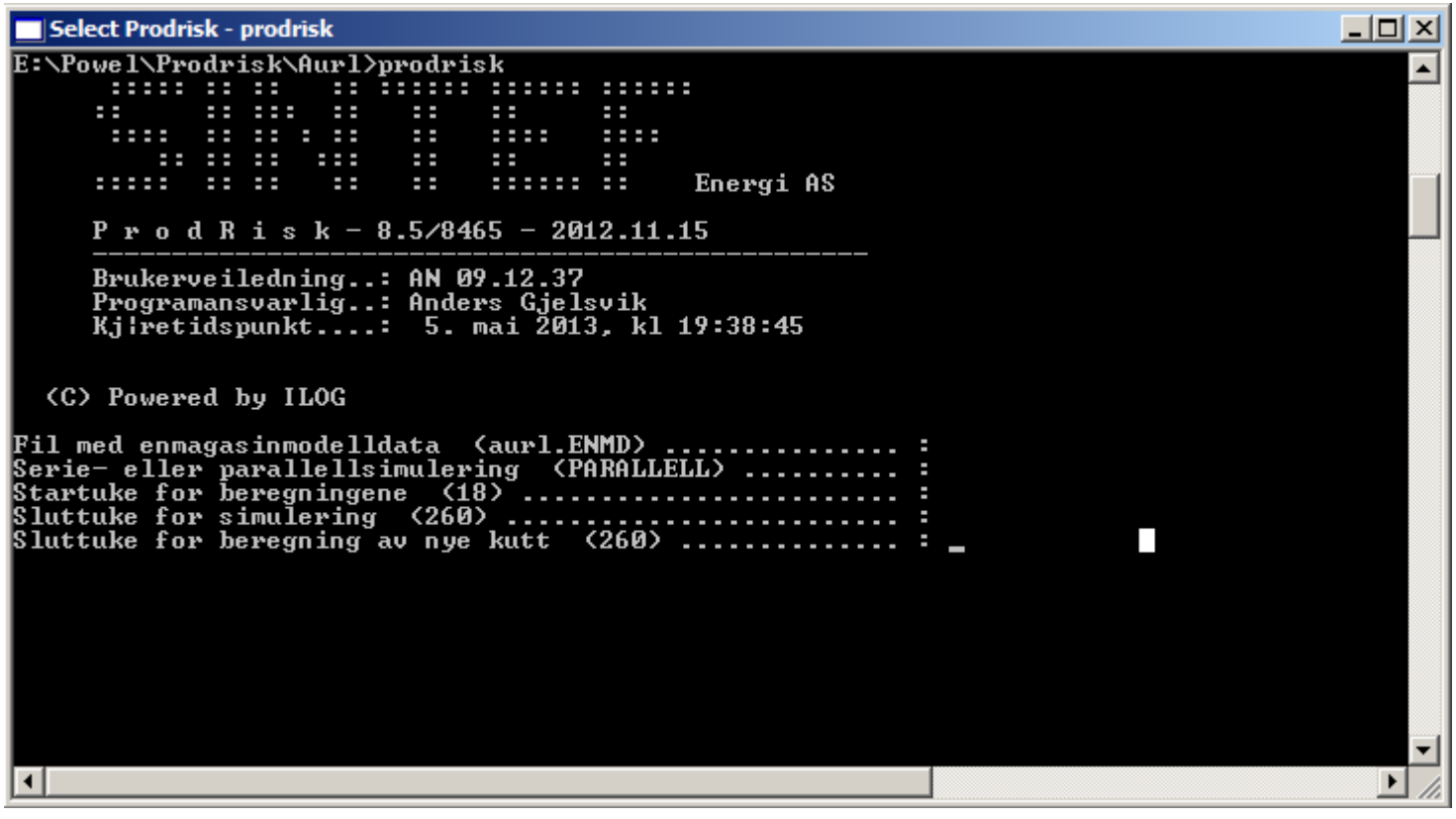


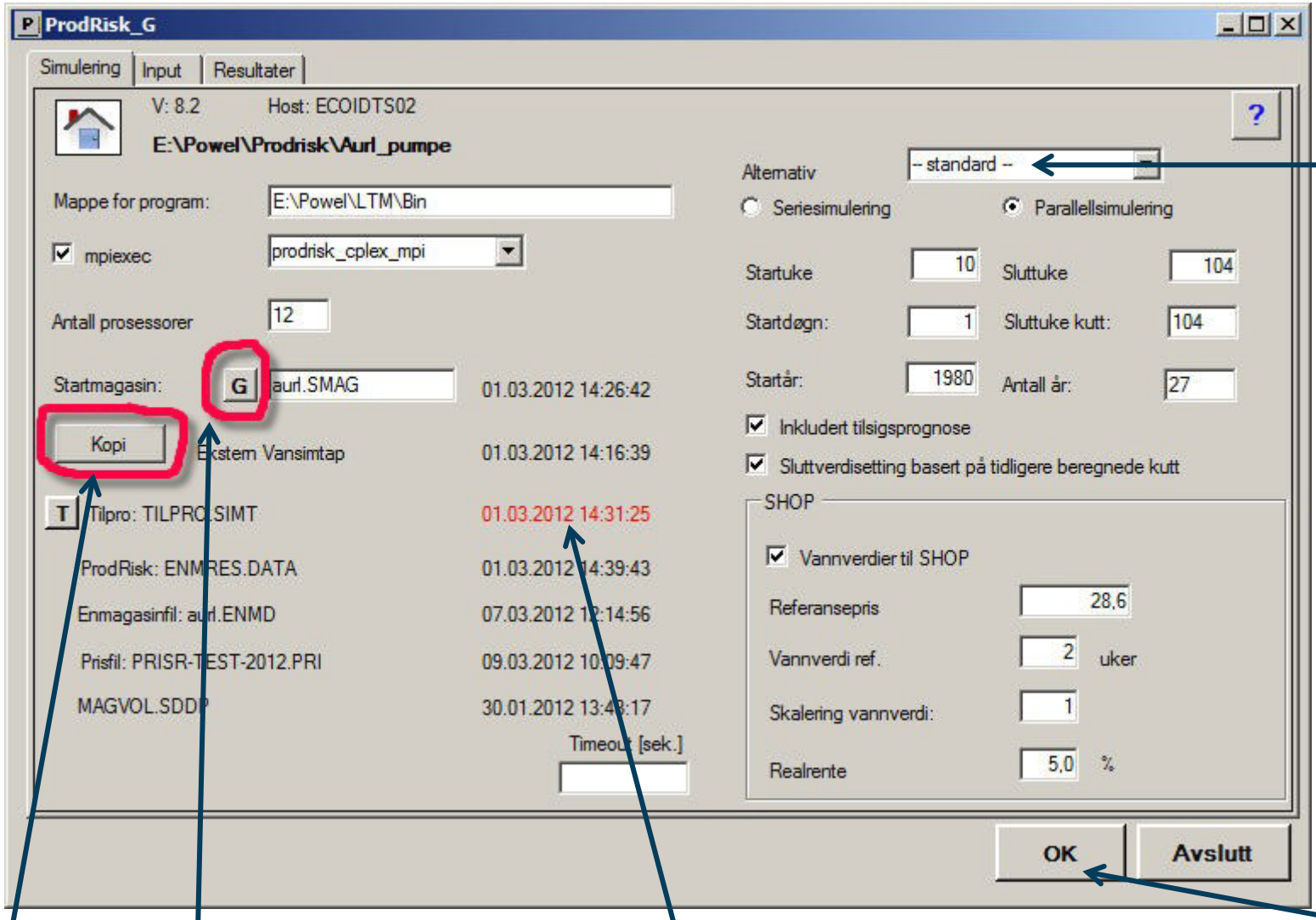
Reservoir

Conclusions so far

- Seems to give higher net value
- More risk averse?
- Some teething problems
- We are quite pleased

Interface (old fashion)





Simulation options

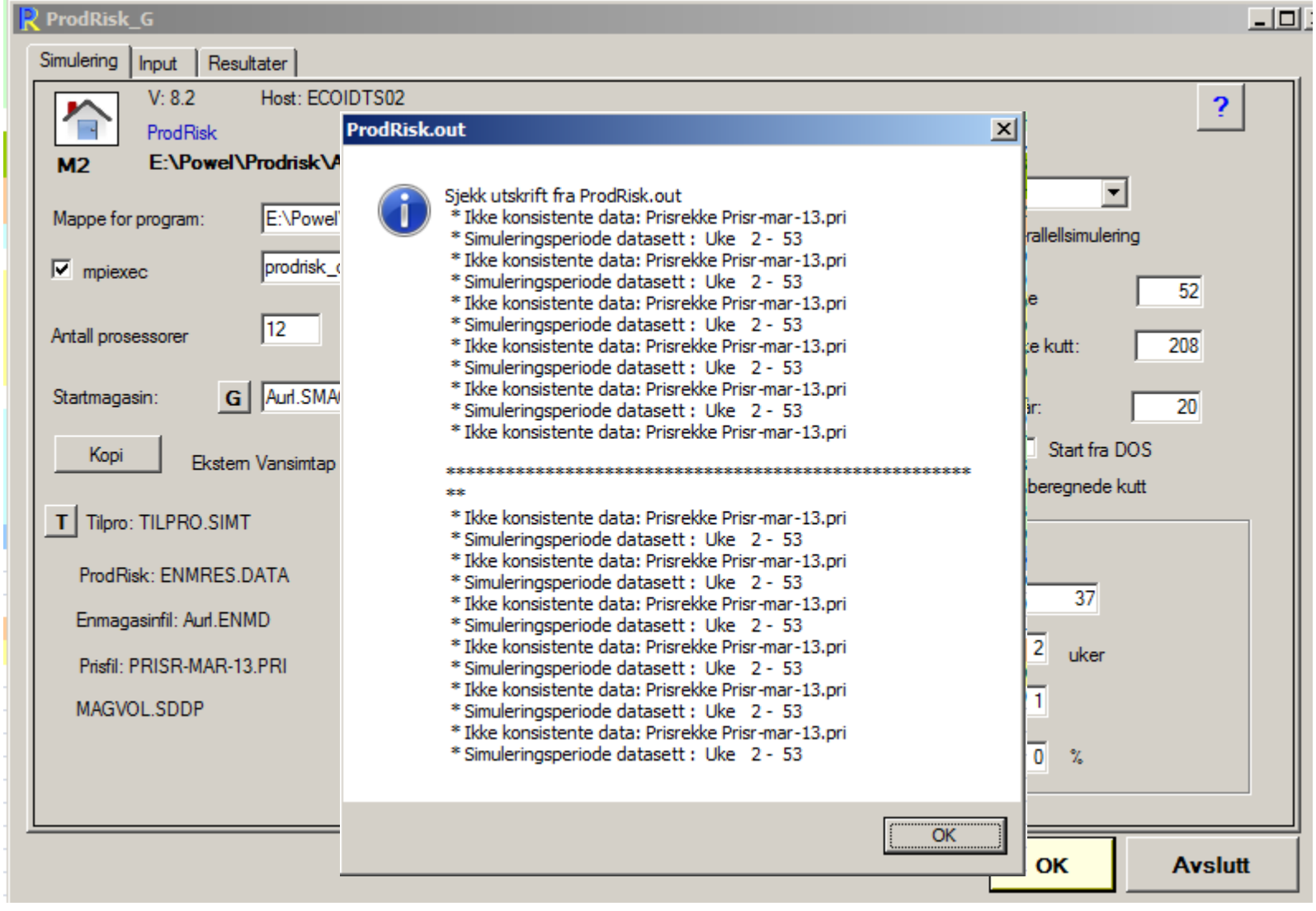
Run ProdRisk

- Show start reservoirs

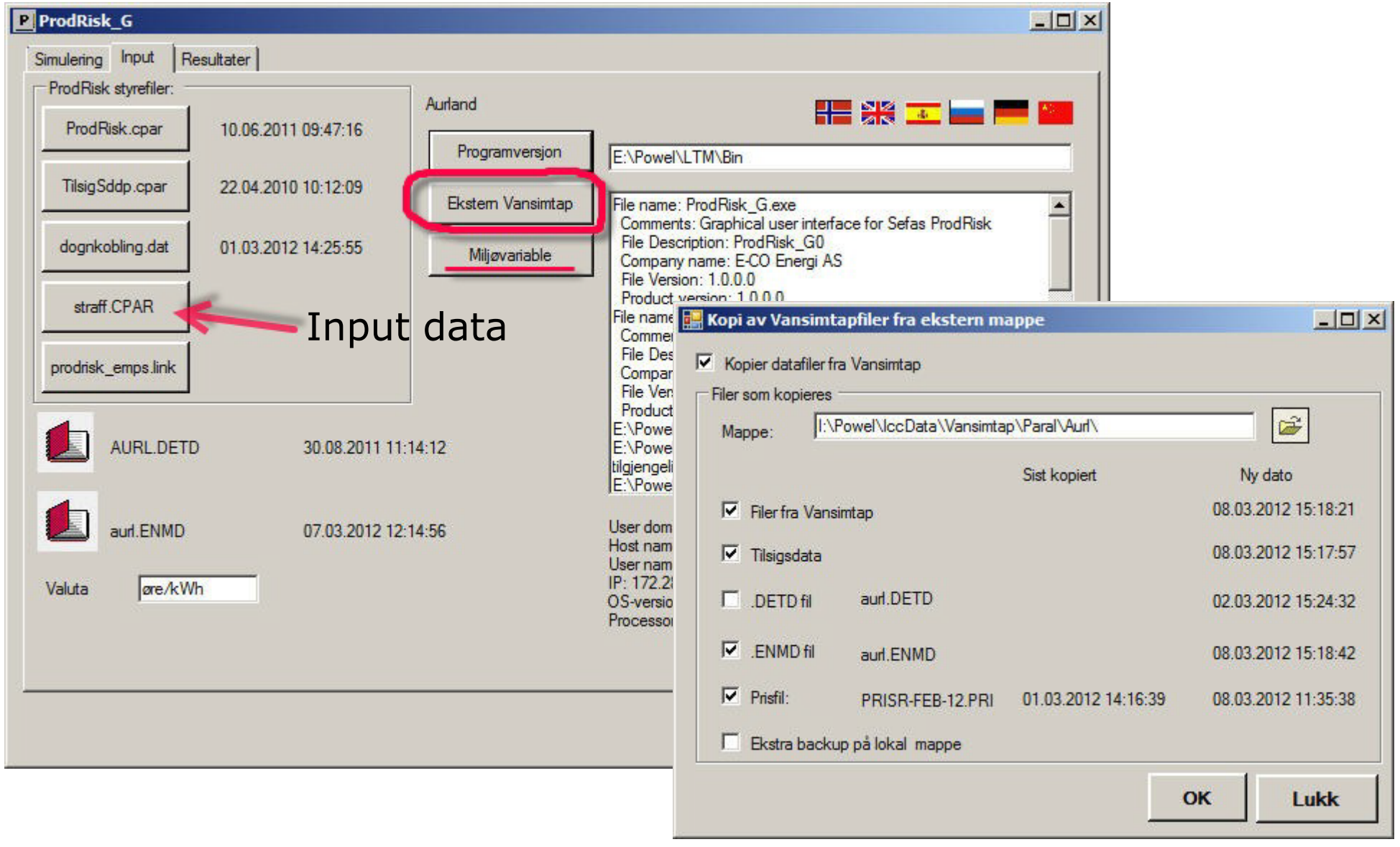
Indication of ”old” files

Copy of external Vansimtap-files

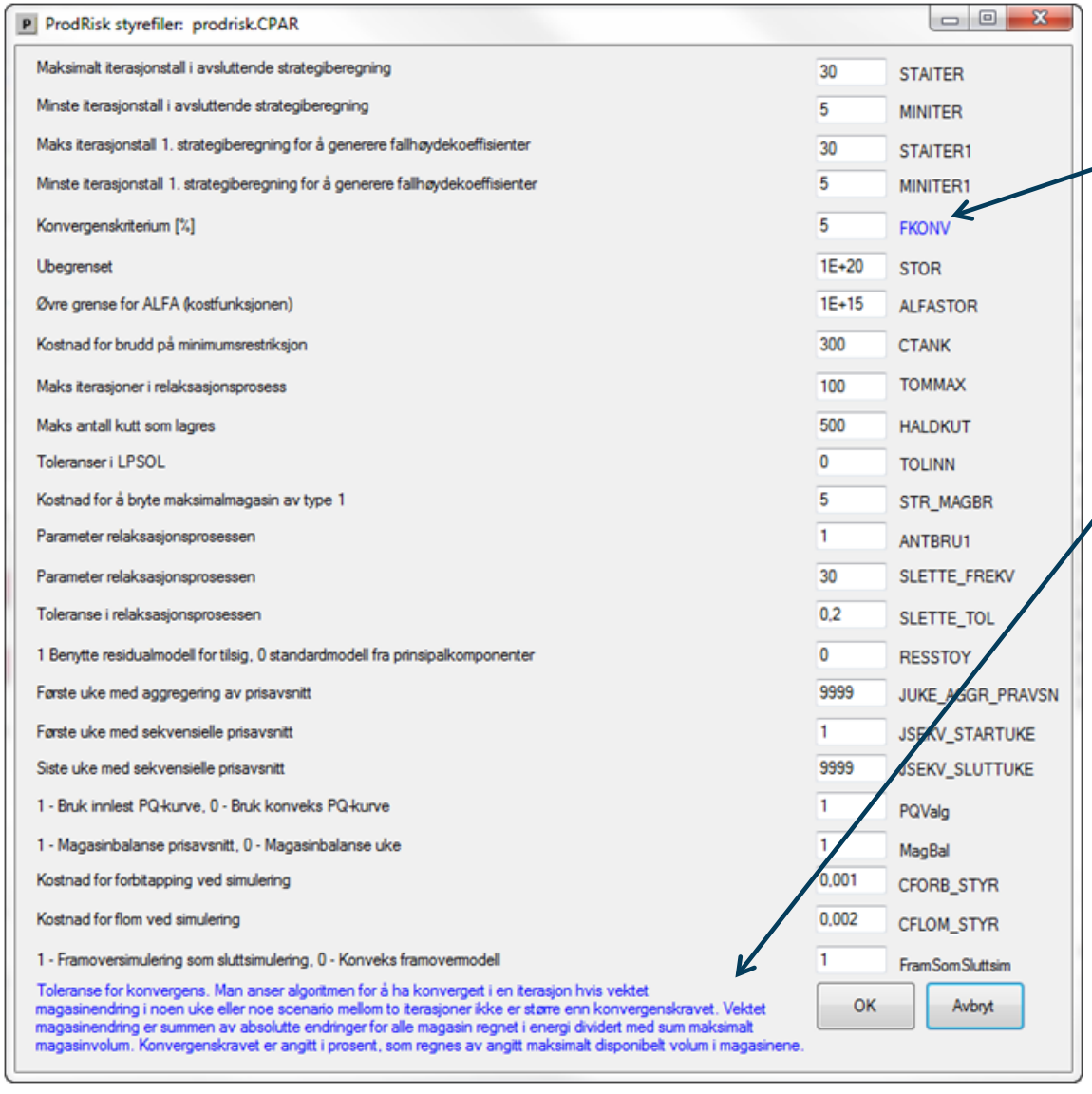
Direct feed back



Copy EOPS data from other directory



Interface for parameter files

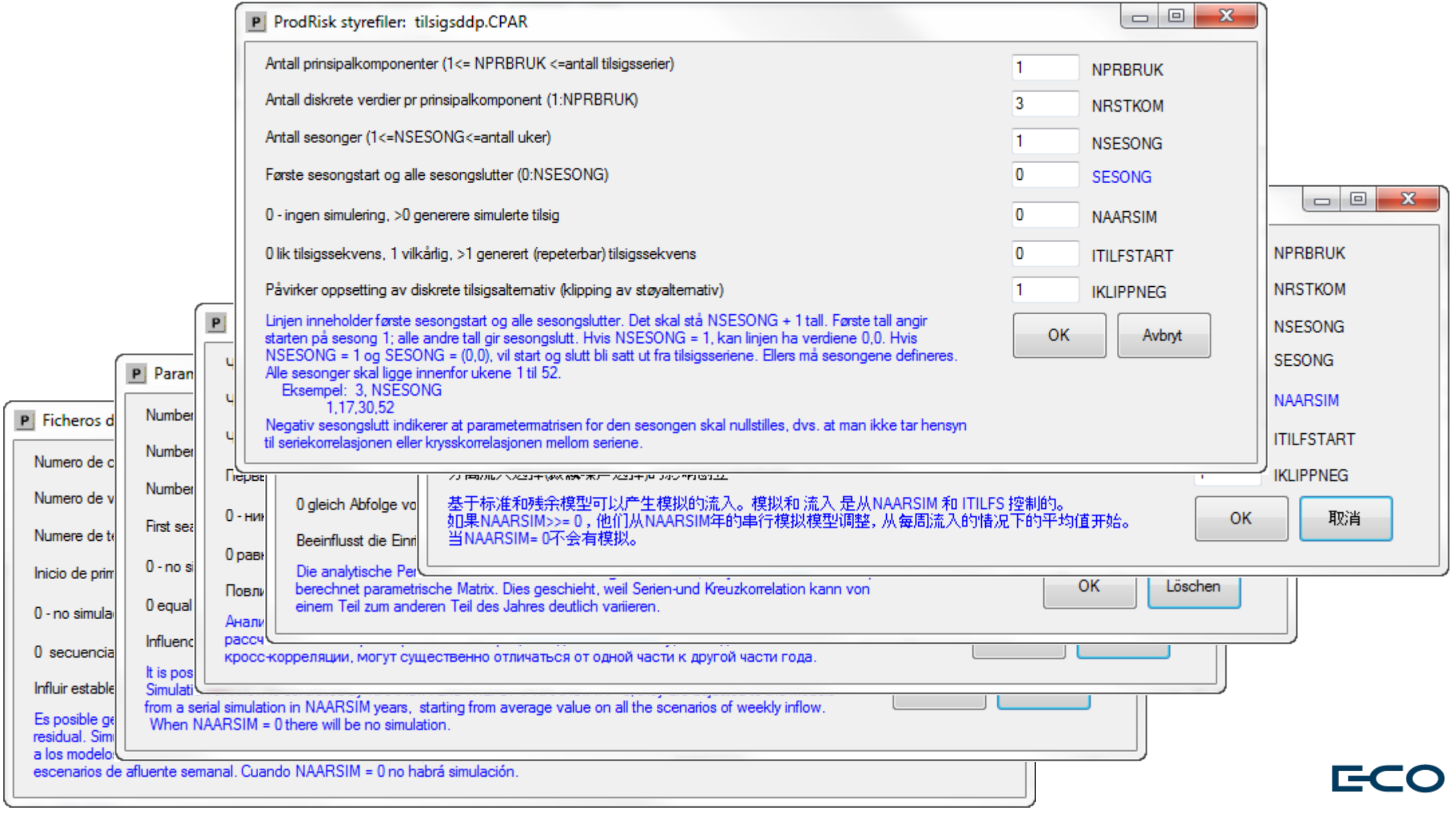


ProdRisk.CPAR

Mark parameter for more information

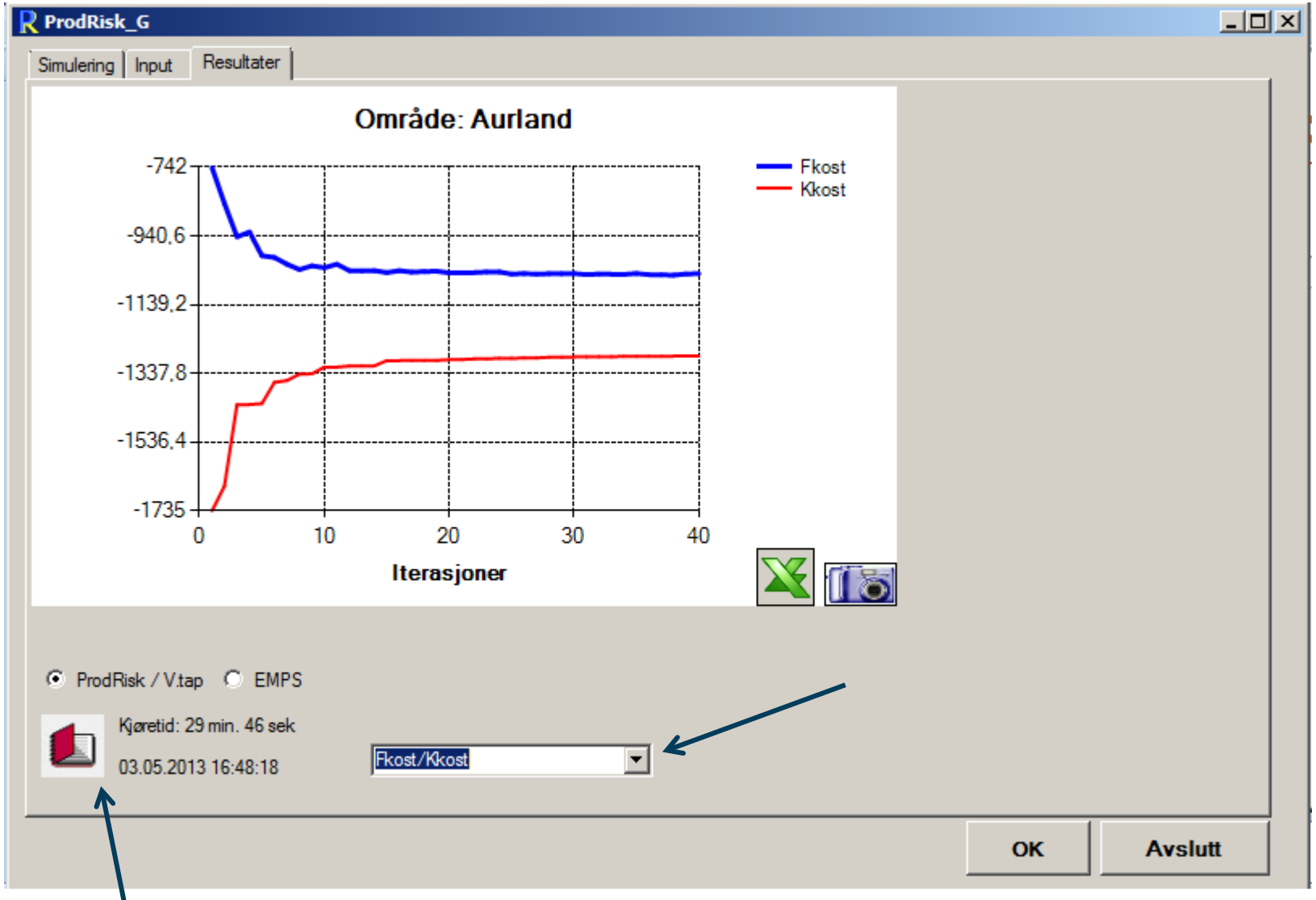
Internationalization ….

ProdRisk.CPAR (example with **6** different languages)



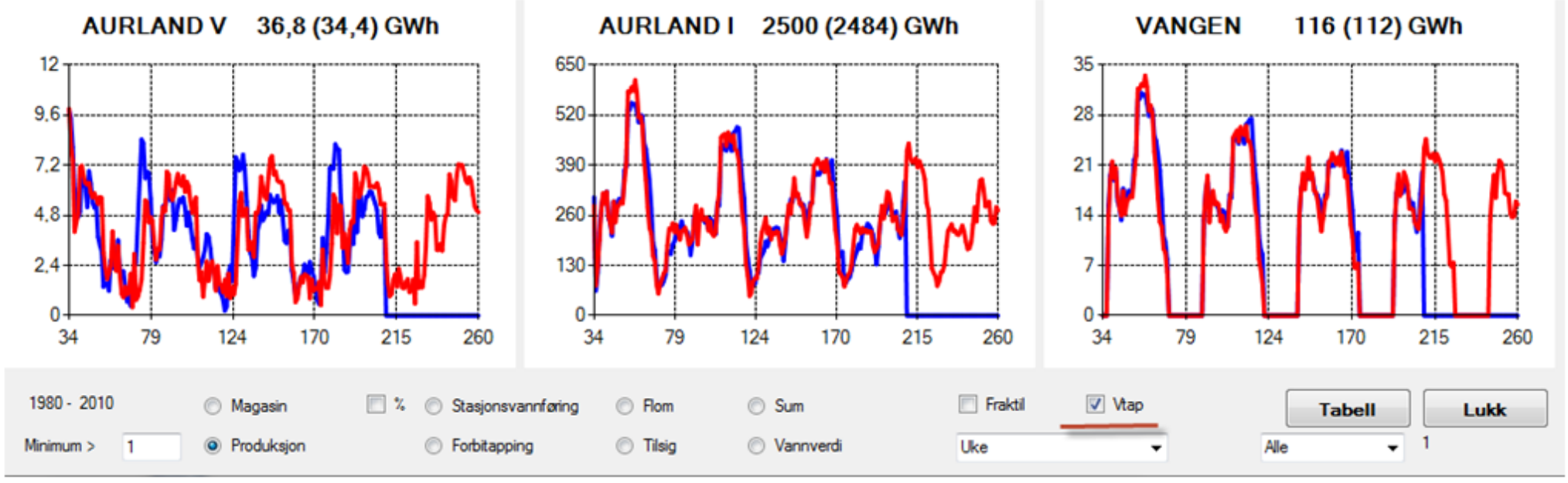
Present results

Results are read from ProdRisk output file, or standard result file (EMPS, EOPS)

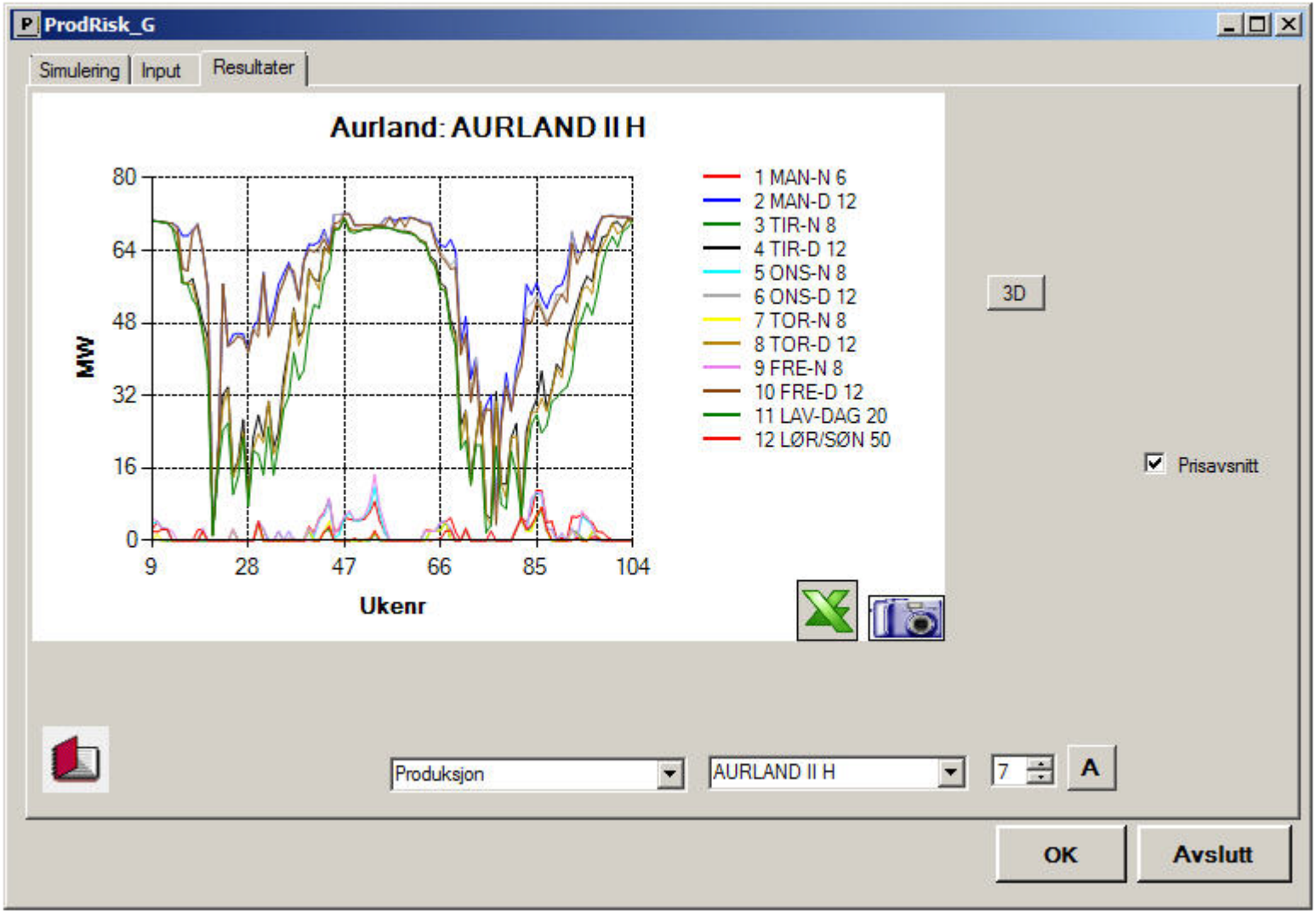


Open output file

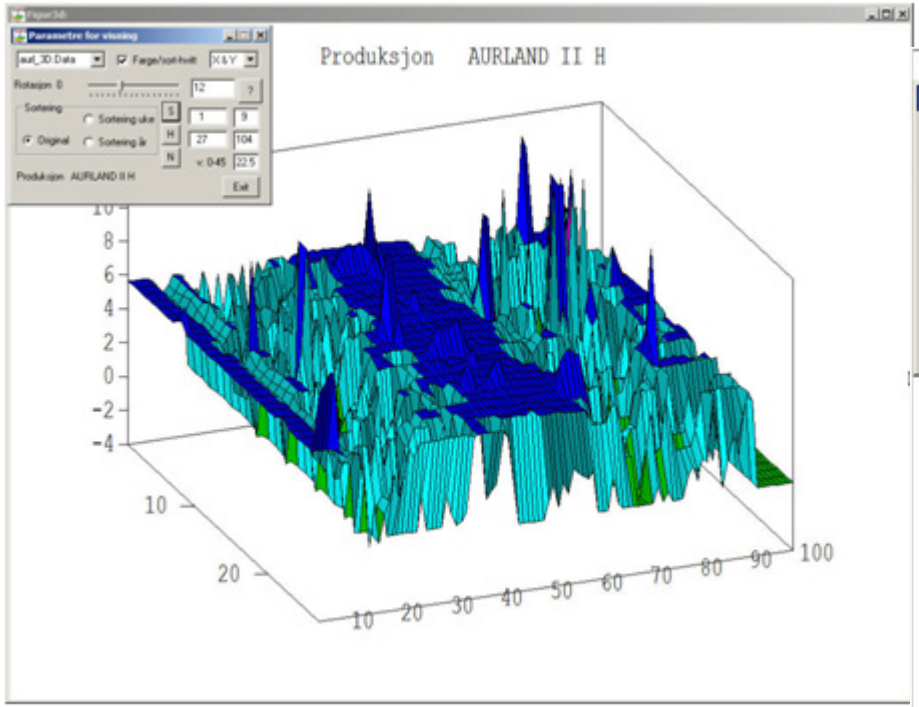
Comparing the models (ProdRisk vs EOPS)

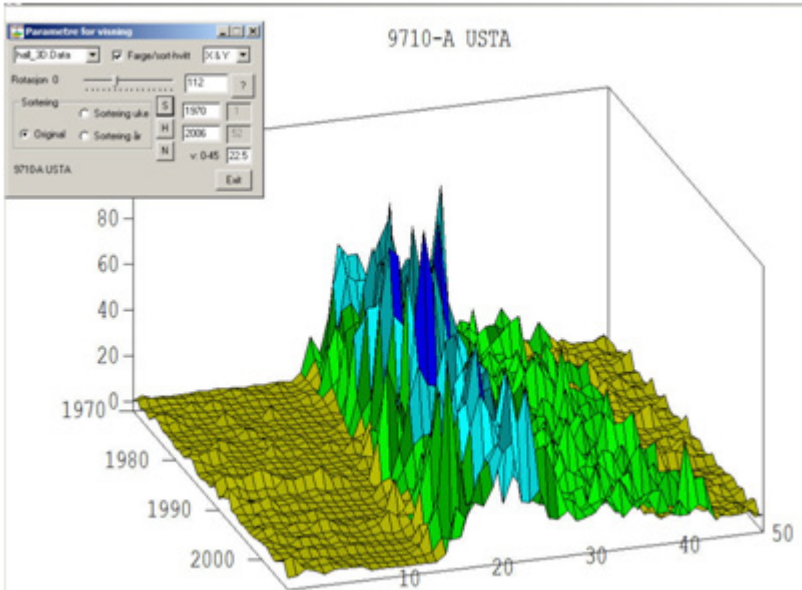


Production, reservoir, discharge, flow ...

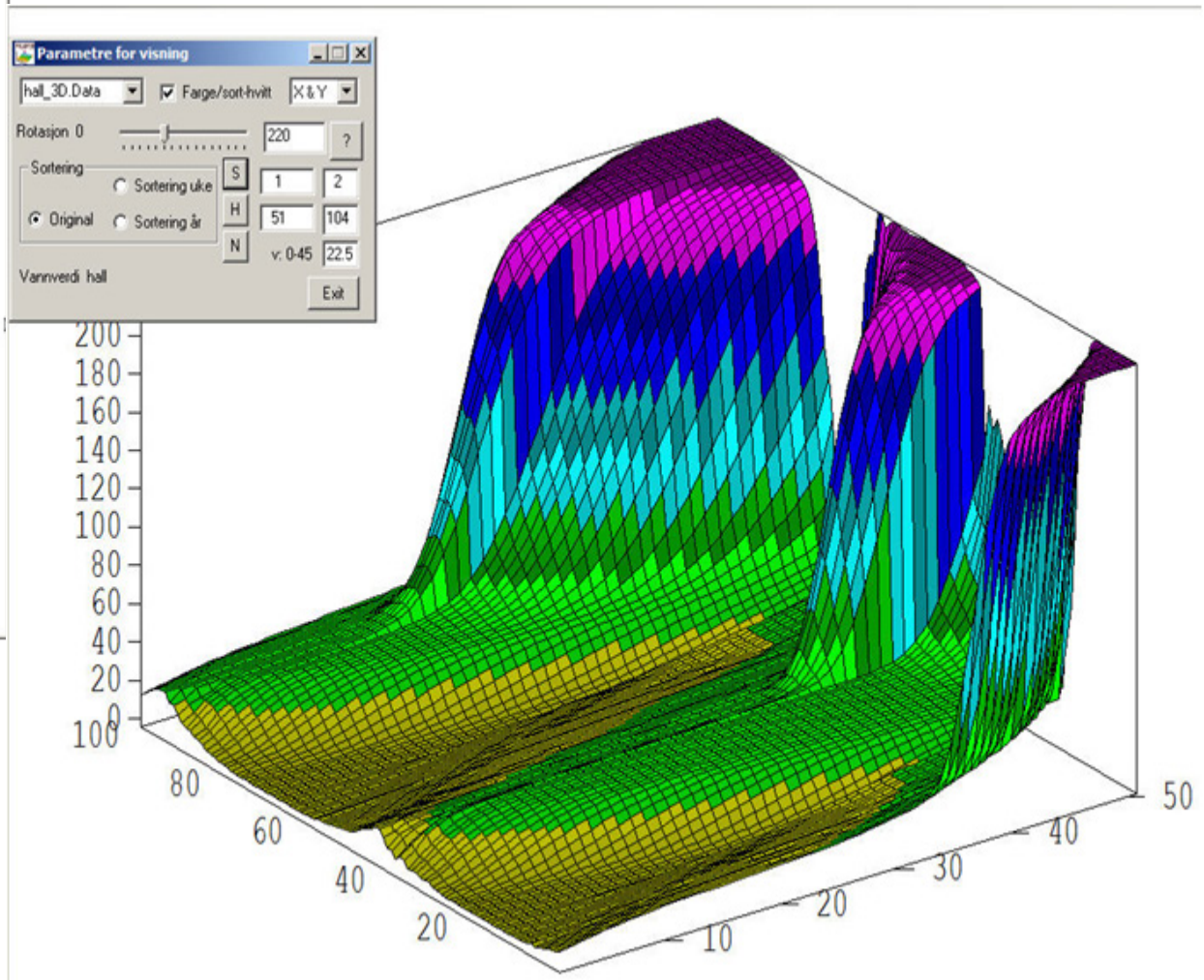


3D visualization

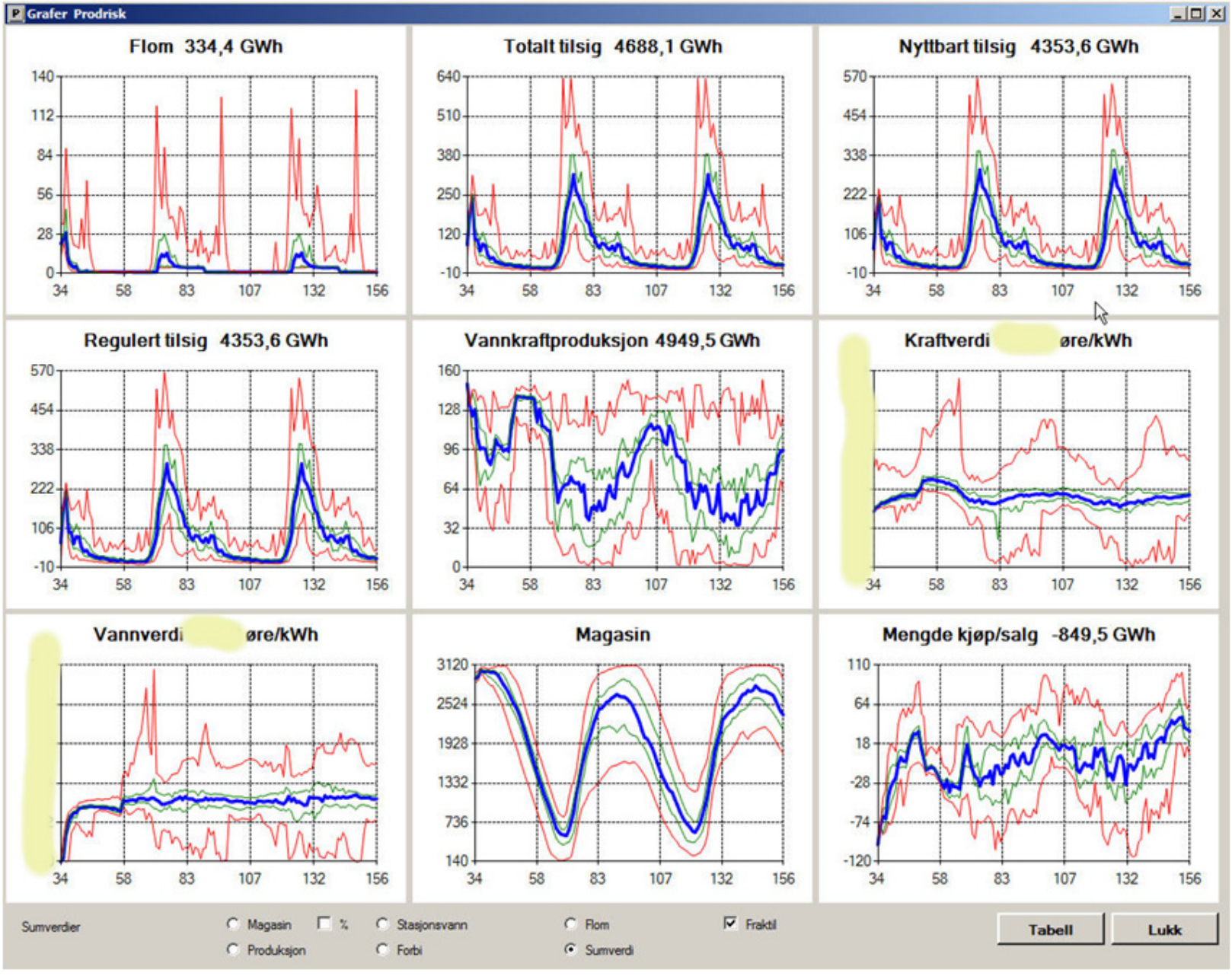




Roterende 3D-graf



Aggregated values



Thank you for the attention!

http://e-co.no