

Uprating acceptable? - Kaplan

- ◆ In the usual operation of a plant, there is cavitation erosion. Its intensity is known from overhauls.
- ◆ If the operation plan were to be changed, what change in erosion would result?
- ◆ Typical situations:
 - the turbine is to be driven at a **higher loading**,
 - or its nominal power is to be made higher.

Would this be acceptable?

Uprating

Example: a 60 MW Kaplan unit

Would its uprating be acceptable?

What cavitation would result if

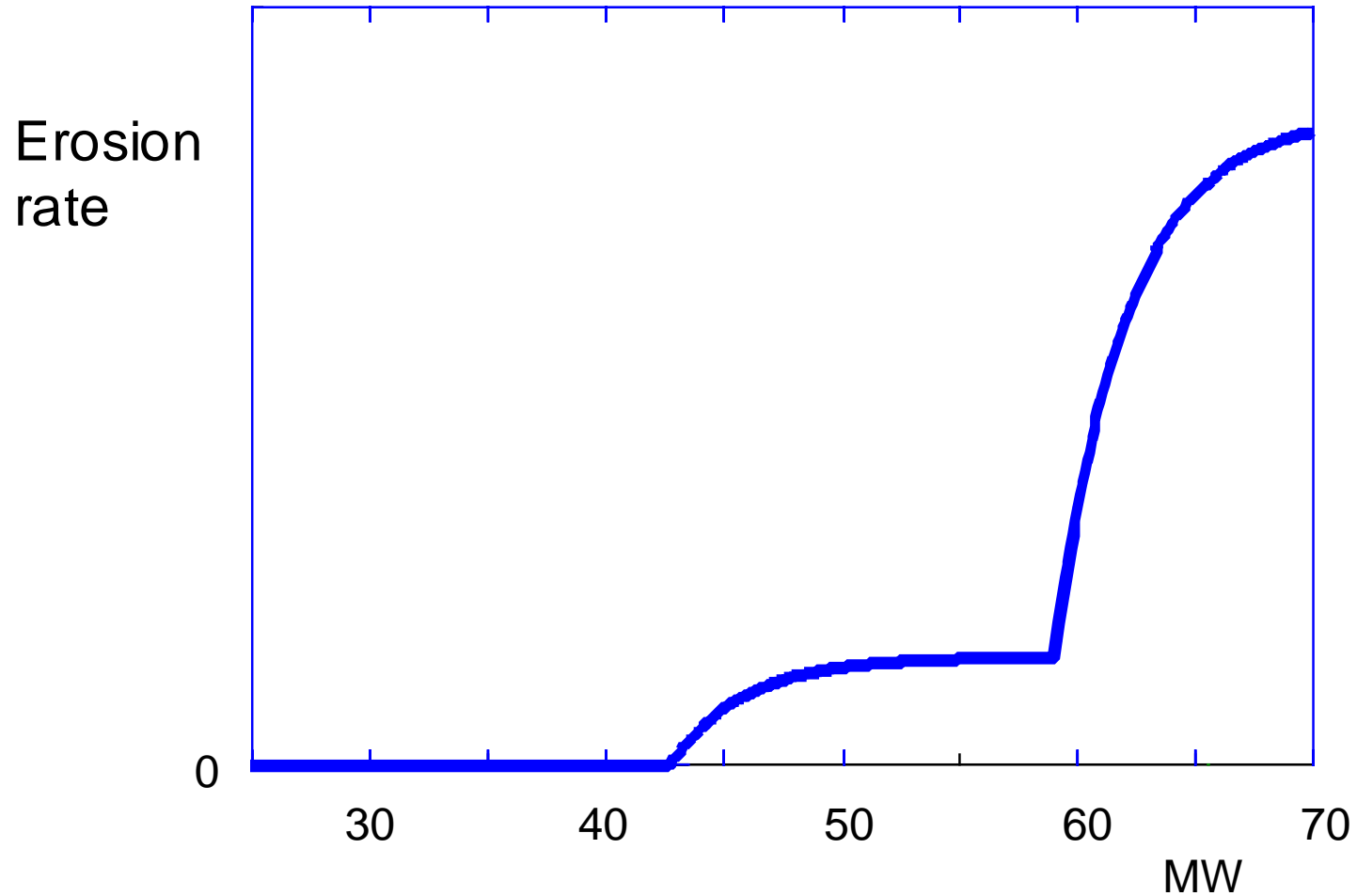
62 MW or 65 MW

were set instead of

60 MW?

Up-rating

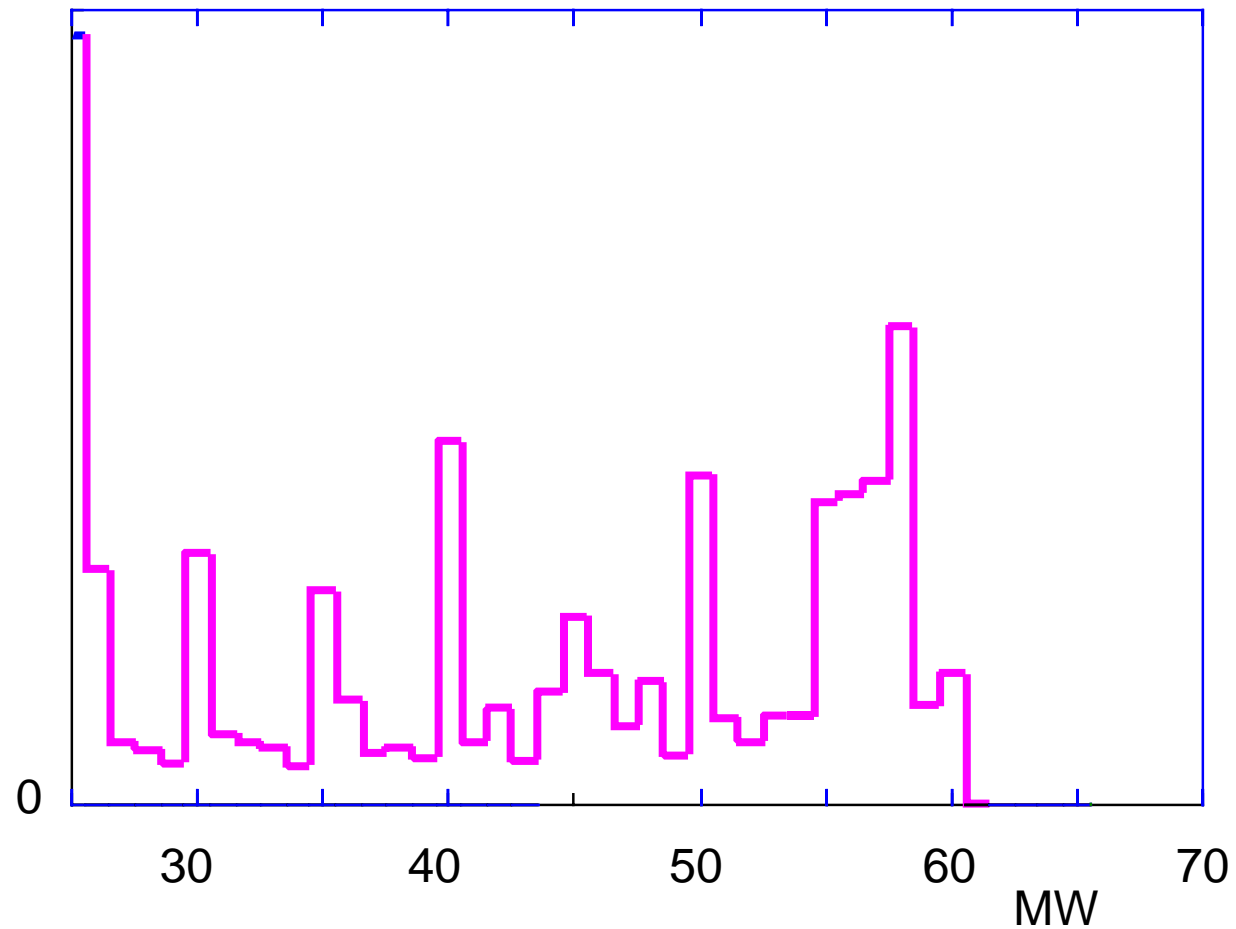
A vibro-acoustical test on the turbine yielded this relative **erosion-rate** estimate.



Upgrading

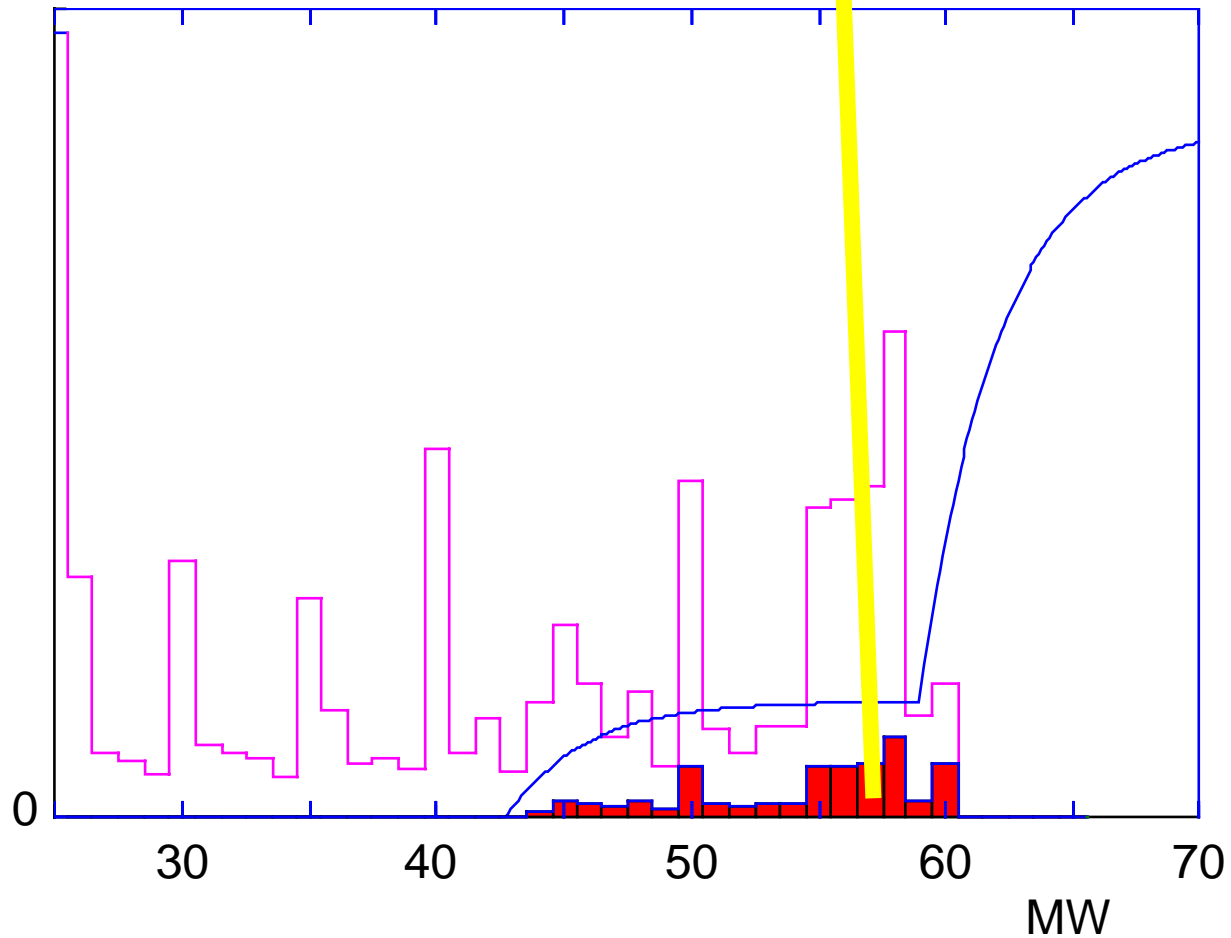
The yearly statistics for the normal unit operation, of up to 60 MW

Time the unit spends within a power-value interval



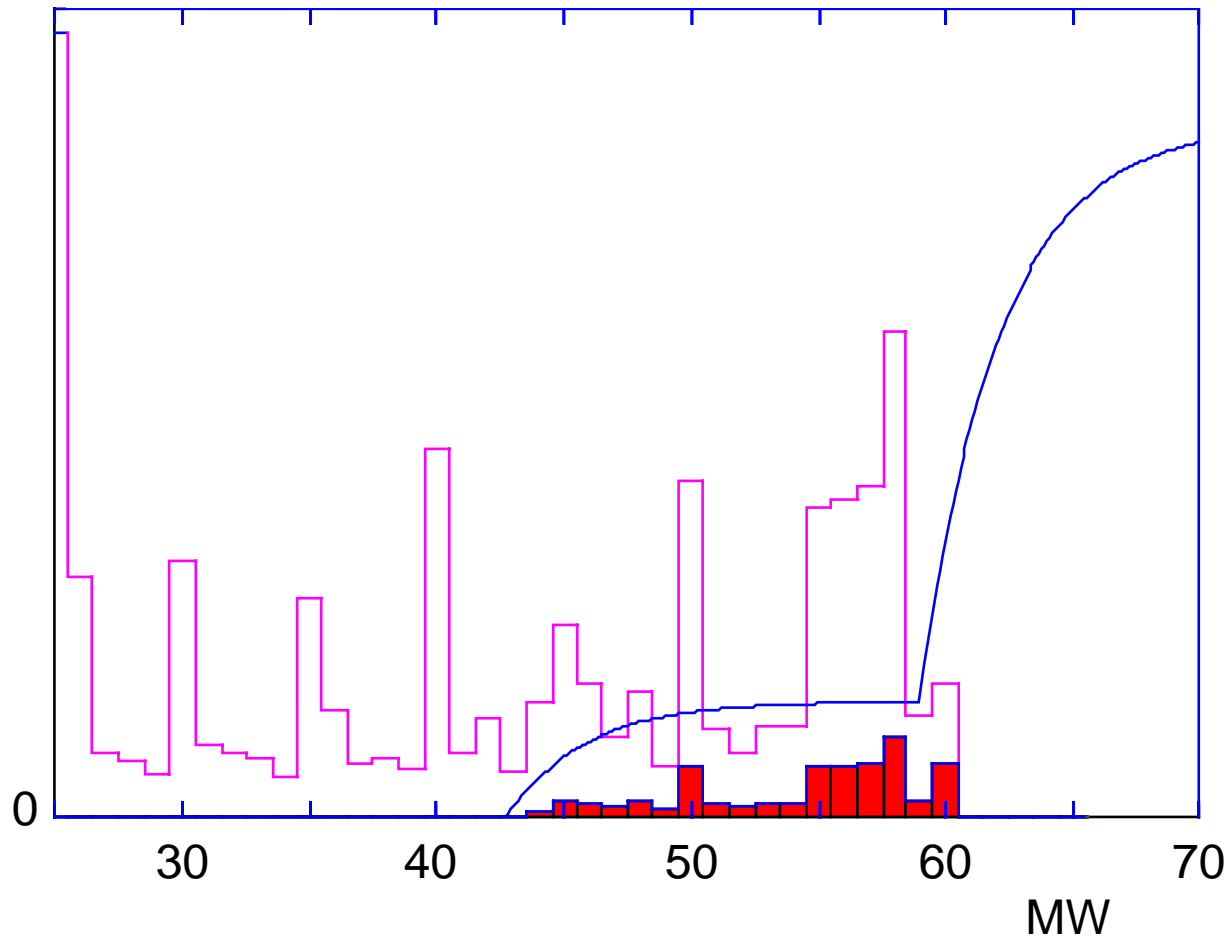
Uprating

The erosion rate and the statistics determine the share that each power value has in the total erosion.



Upgrading

Denoting the sum of the shares as 100 %, yields the following:



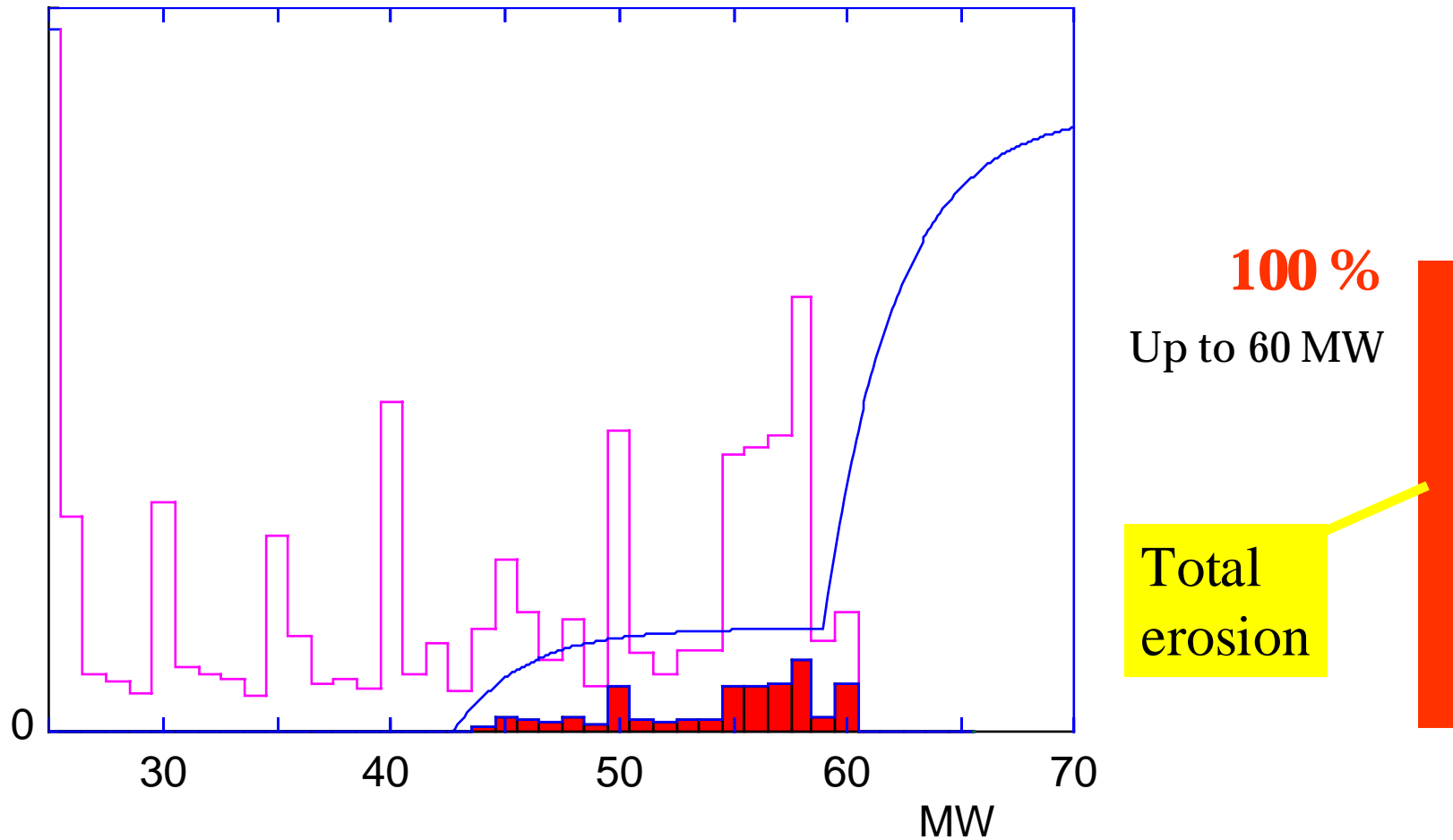
100 %

Total erosion

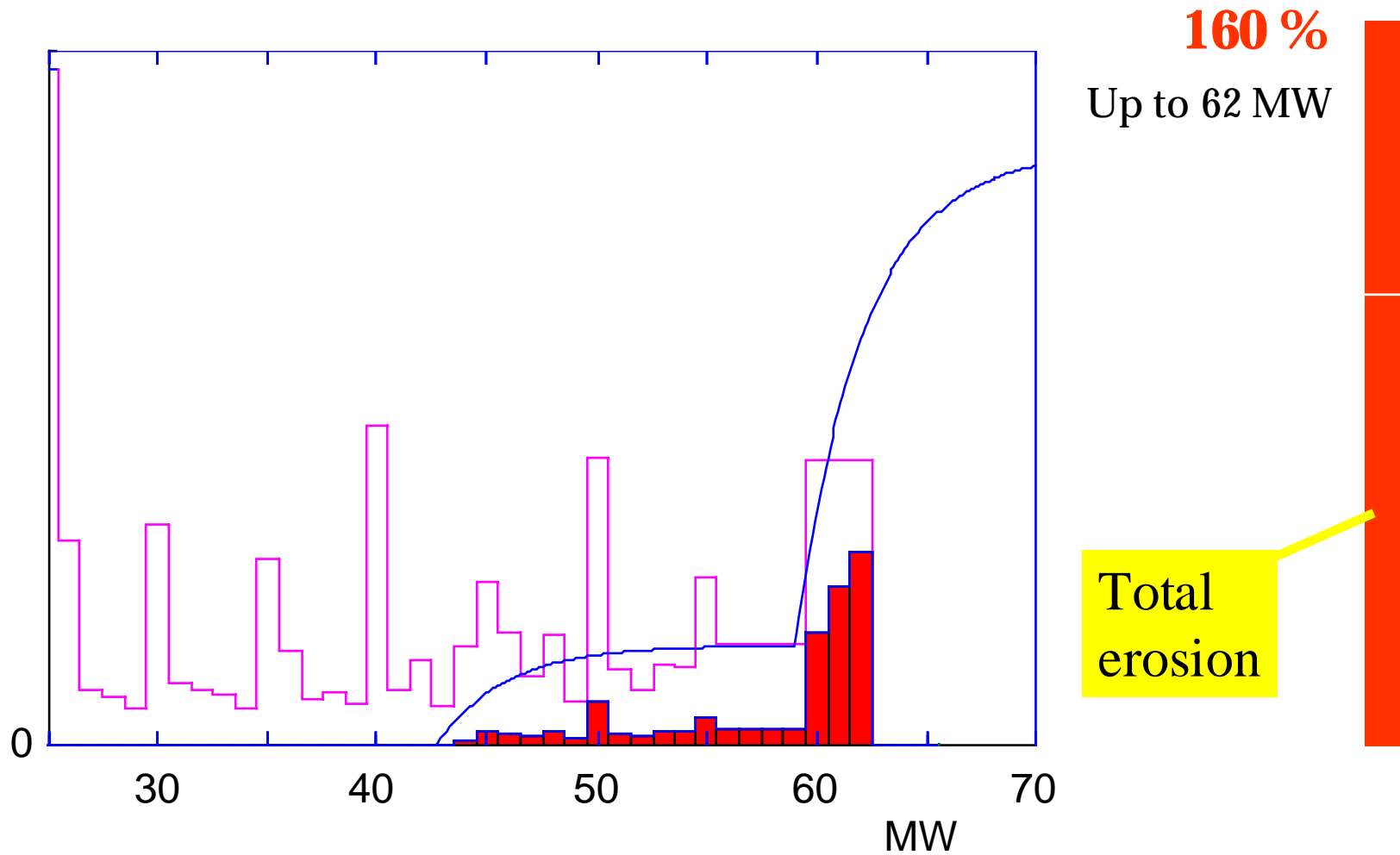


Upgrading

Now, if this is the situation when operating up to 60 MW, what would the situation be at a higher loading?



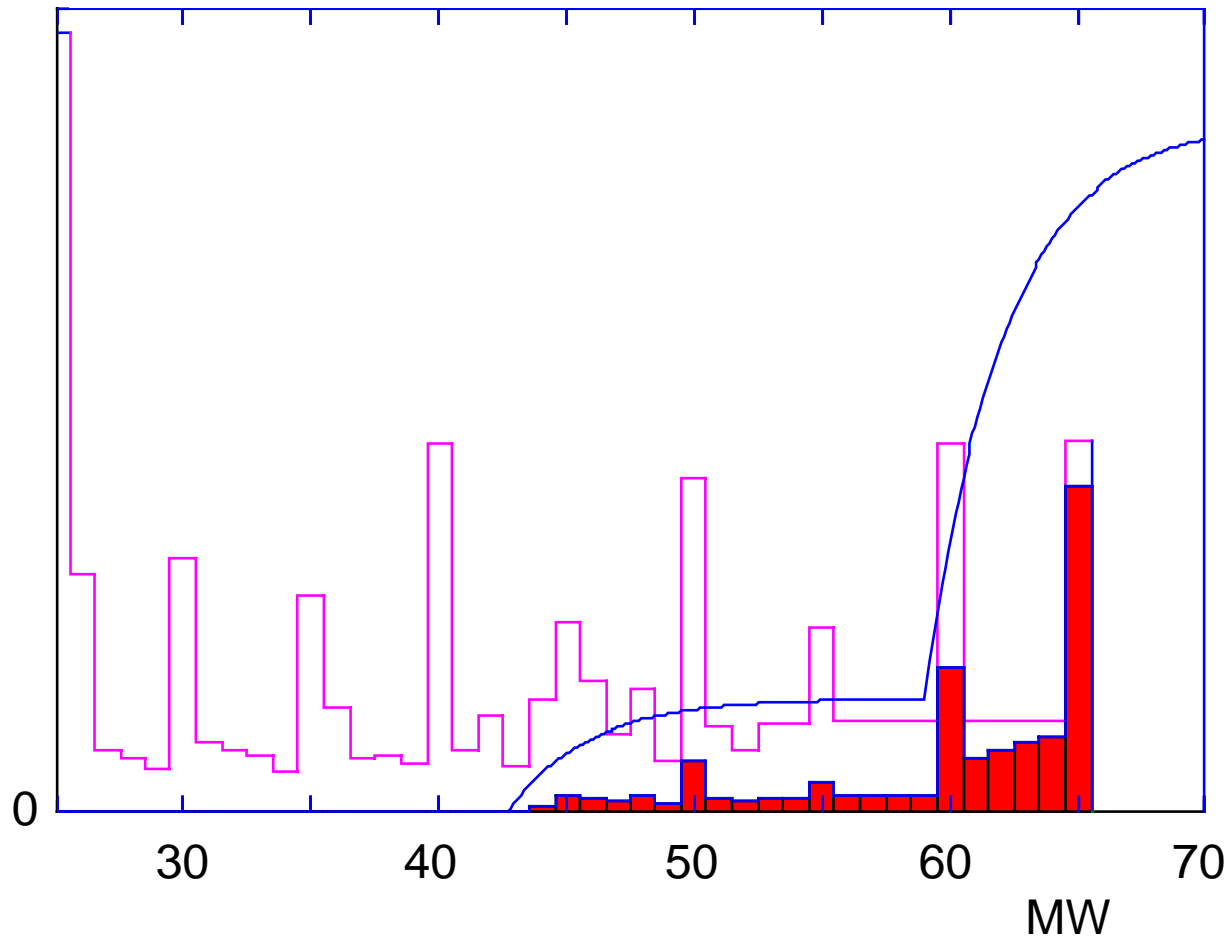
Uprating



Uprating

220 %

Up to 65 MW



Total erosion



Uprating

Therefore:	Maximal loading	Total erosion
Present situation	60 MW	100 %
Prediction	62 MW	160 %
Prediction	65 MW	220 %

A cost calculation based on this technical result shows whether or not the uprating would be acceptable.