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NEW ASPECTS OF PML ESTIMATION IN CAR AND EAR INSURANCE

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PML-Estimation for **CAR/EAR** Risks

1. Introduction

Under the impression of recent large claims in the fields of contractors insurance (LUC-building in London) and erection insurance (Sikel foundry in Se19ium) the insurance technical commission for engineering insurance within the German federation of property insurers installed a project group with the purpose of developing the base tor the estimation of the PML tor CAR/EAR risks. This base presents the frame for today's IMIA-presentation.

It must be stated, though, that several definitions are already in existence, yet none of them cover the full scope of the problem. In particular the 1973 IMIA-Paper regarding the determination of the PML in the field of technical insurance as well as the CEA-definition concerning fire insurance (PML/EML) ought to be mentioned.

Today's presentation tries to go beyond the current definitions and is meant to give underwriters assistance for their underwriting and reinsurance policies. It must be kept in mind, though, that construction and erection insurances offer all risk coverage. Therefore the individual dangers are decisive tor the determination of the PML. The following risks are thought to be most relevant tor the PML

- fire
- natural dangers
- technical risks
- political risks as well as terrorism and sabotage.

The following report shall examine the risk relevant dangers in detail. Regardless of that the PML estimation with respect to 1arge projects must remain subject to a specific analysis. In particular, sufficiently detailed technical information must be provided by the insured upon request. The main proble1t for PML estimation with respect to CAR/EAR risks lies within the fact that at the time of the closing of the contract the project actually only exists on plans and drawings. And even these in many cases may not been reviewed by the insurer. It may also often be the case that subdivisions or sums with respect to parts of the project are not available. We therefore suggest that comparable projects should be looked at for the purpose of risk evaluation and - if possible - worldwide claims experience should be taken into consideration.

2. Fire and Explosion risks

2.1. FML evaluation basis

The PML with regard to fire must be viewed as the insurance sum of the geographically adequately isolated fire complex with the concentration of the highest values. A 1ocation is regarded as geographically adequately isolated, when the minimum distance to the next is at least 20 meters, construction site fittings and material storage taken into consideration. At the same time changes during the construction and erection phase may create different fire complexes (e.g. due to construction site storage of material) than after completion or during test runs. Even superstructures such as bridges and subterraneous connections may dissolve a complex separation at least at times.

A special difficulty arises with the insurance of large industrial complexes, for instance steel, aluminium and cement production plants and especially production sites of the chemical industry. As a rule, no detailed complex descriptions exist (large open air sites prevail, building complexes are of minor importance). With this kind of sites, technical pre-contract talks are indispensable. If not feasible the under-writer is recommended to reach an agreement on a compensat1on limit which may then be referred to as the PML. As far as applicable, with respect to the chemical industry, the so-ca11ed UVCE (Unconfined Vapour Cloud Explosion) is regarded as the PML defining occurrence.

2.2 PML-diminishing influence factors

Reductions can only be granted with intimate knowledge of the technical facts and conditions. E.g. structural engineering risks may be eligible tor a reduction of up to 20 % due to the type of foundation.

A reduction may also be considered, when buildings are to be insured which present a non existent to minimal structural fire risk due to the material used, for instance when no or only few inflammable parts or construction materials, especially inflam-mable insulating materials, are employed. The same is applicable when a lower fire risk for the interior installations can be assumed due to the absence of inflammable interior fittings or the installation of largely inflammable technical appliances.

Stationary fire-fighting systems and structural fire protection (such as sprinkler systems and fire protection walls) may on the other hand not be considered as PLM diminishing influence factors as, during construction and erection it is not guaranteed that they are already in service or in existence. We recommend to take a “worst case” look at the impact of such protection installations.

Structural or workmanship inherent PML-diminishing factors should generally only be considered, if a constant respective inspection of the construction site will be carried out.

2.3 PML-increasing influence factors

Proceeding from the PML-evaluation basis described in 2.1 the following surcharges should be effected depending of course on the wording of each contract:

- Debris removal costs (limit recommended)
- Fees for waste site discharge (limit recommended)
- Decontamination costs (limit recommended)
- Increased costs for reconstruction
- Architects' and specialists' fees not included in sum insured
- Extra charges for express freight and overtime
- Consequential damage to neighbouring buildings as a result of smoke, extinguishing water and other related causes
- Damage to construction/building machinery
- Liability claims
- Damages to existing property

We recommend fully including all contractual first loss sums in the PML calculation.

2.4 Special situation of conventional power plants

With respect to power plants with steam generators, which are fuelled with fossil burning materials such as gas, oil, brown or hard coal we recommend the following procedures based upon many years of worldwide damages observation:

The PML assessment with respect to power blocks between 75 MW and 700 MW may be handled with the aid of the enclosed graphic diagrams. Power plants above this upper limit must be evaluated individually in each case. When looking at the graphic diagrams it must be taken into account that the specific investment sums for German plants (of the former West German States) were used as a basis. In addition, PML estimates for power plant details (e.g. particular coverage tor turbines, flue gas desulphurization etc.) must be carried out individually, especially taking note of technical risks.

The following components are important for the extent of damages within power plants:

- Steam generators (DE)
- Turbo-generator (TG)
- Flue gas desulphurization plant (REA)
- Denitrification plant (DENOX)

Of these the steam generator and the turbo-generator are the most important components, worth wise. The starting point for these two risk groups are documented in the enclosed graphics concerning investment costs (Enclosures 1 and 2).

Based on many years of world wide c1aims experience the PML estimation was grounded on the fact that the level of destruction found with a DE - thus indicating the claim and the PML – largely depends on its performance characteristics i.e. its power and its fuelling. Examples for secondary damages spreading to DE, which have been installed in the same building or direct1y neighbouring locations without sufficient geographic or structural separation are depicted schematically and strongly simplified in enclosure 5.

The probable damage for DE and other power plant components with regard to secondary damages have been transferred into a so cal1ed four quadrant diagram.

- Diagram 3.1 refers to single block plants
- Diagram 4.1 refers to multi block plants.

Apart tram special cases REA’s are geographically and/or structurally separated from DE’s. Secondary damages need only to be considered when they are situated directly in the boiler room. They have to be assessed individually.

DENOX in low dust modus are usual1y separated geographically and/or structurally from DE’s. Only in case of a high dust modus with a direct attachment of the DENOX to the DE does a secondary damage need to be anticipated. The DENOX damage must in this case be added to the DE damage.

The effects with single block power plants may be seen in enclosure 3.2; the effects with regard to multi block power p1ants may be seen in enclosure 4.2. The PML estimate for a multi block power plant with three block is documented in enclosure 4.3.

The following needs to be kept in mind with respect to the data underlying the diagrams:
Investment costs for power plants are subject to strong fluctuations (e.g. due to the market situation in the country where the investment is made, boiler aptitude with regard to specific fuel burners etc.). The 1990 level of the Federal Republic of Germany including specific safety surcharges was used for the present data. A revision of the sums shall be necessary in 1995 at the latest.

3. Natural risks

3.1 Earthquake.

When insuring the risk of earthquakes, it is necessary to determine in which zone the insured objects are situated. Is the object situated in Zone I (corresponds with VI on the modified Mercal1i scale), the project group is of the opinion that the earthquake risk must not be regarded as determining tor the PML, it is implied, though, that the criteria for earthquake resistant construction are being met.

With regard to other zones an individual risk-survey is indispensable and in extreme cases the PML must be considered equal to the insurance sum (possibly plus additional insured costs).

3.2 Flooding

The risk of flooding must be determined individually according **to** where the construction site is located. Especially when danger of flooding is imminent due to the geographic location (e.g. location of construction site lies close to the coast and below sea level) a PML determination with a tendency towards 100 % is recommended.

Special interest must be put into the risk of floodin9 leading to a total 1055 regarding river-deviation measures (e.g. trunk dams, canals etc.). PML determining with regard to curved dam walls (single or double bend) is the danger of collapse, caused by technical failure or by faulty design or workmanship, which usually occurs during the first phase of flood1ng (checking if coverage is granted for this phase is possibly necessary).

3.3: Storm

The risk of storms must also be evaluated individually according to the location of the construction site. Especially with regard to buildings it must be kept in mind that during the phase of construction or erection the extent of storm risks may be enlarged due to lacking stability. Additionally the combination of actual damage to the object of construction or erection with damages to the site’s infrastructure must be taken into account.

4. Technical Risks

In general technical risks must always be considered when the fire risk is not covered and also special natural risks are not involved. A list of percentage rates which may be utilized by underwriters for orientation with regard to the technical PML is still in preparation.

The PML evaluation for the construction of tunnels should generally be based upon a tunnel collapse due to faulty design or workmanship. Only when the interior fittings give an indication for an increased fire risk should this risk be taken into consideration.

Due to the lower risk of fire or explosion in combined cycle power plants of new design a technical failure of the (gas turbines should be considered when estimating the PML. According to the amount and location of the gas turbines (a maximum of 4 is assumed) the value of 1 or 2 gas turbine sets should be calculated including the damage inflicted upon neighbouring components due to a spreading of the damage.

5. Political risks, terrorism and sabotage

When including these risks underwriters are cautioned to be especially prudent and restrained. In general the additional coverage for these risks will lead to congruence of the PML and the insurance sum. It is therefore strongly recommended, especially within countries where these risks are regarded as rather high, to either refuse such coverage or – if inevitable – to reach an agreement of indemnification limits.

It is self-evident that political risks ought not to be insured without the right of cancellation.

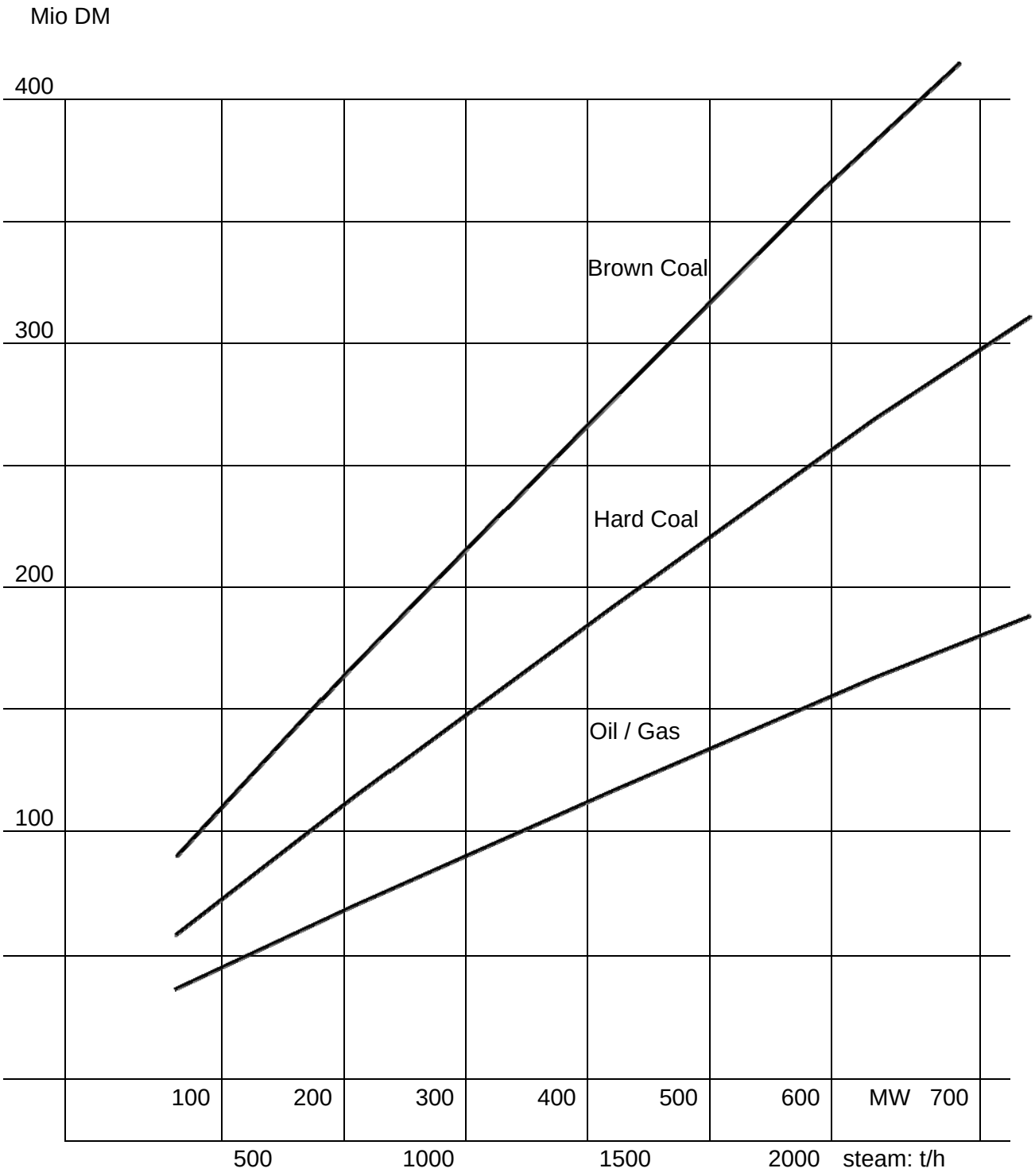
6. Examples of damages

Reaching the end of this presentation the following four examples of damages are to be outlined:

6.1 London Underwriting Centre – Fire
6.2 Container Terminal Hongkong – Fire
6.3 Foundry plant Belgium – Fire
6.4 Storebaelt – Flooding

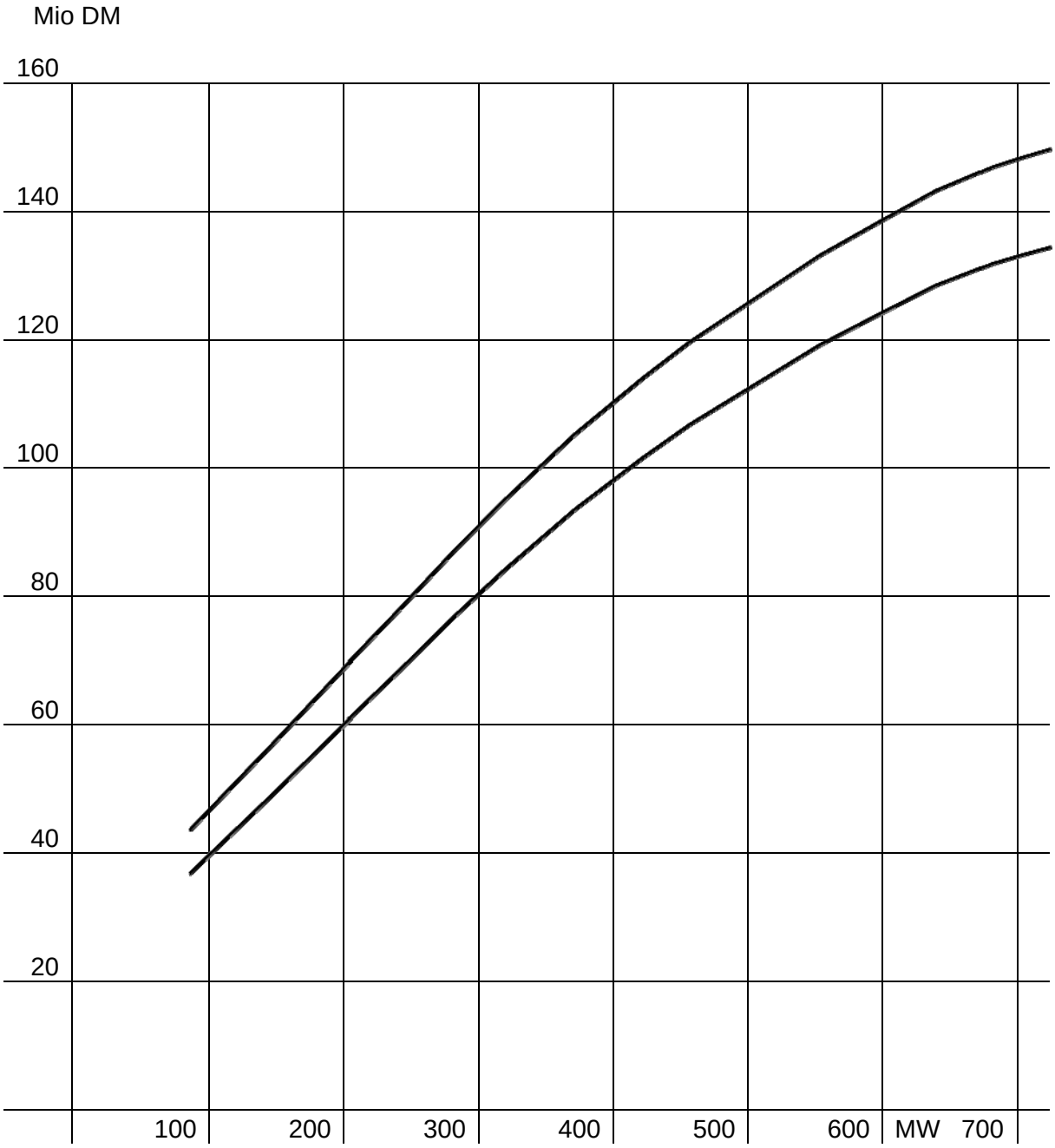
Munich, July 1993

Encl.
I



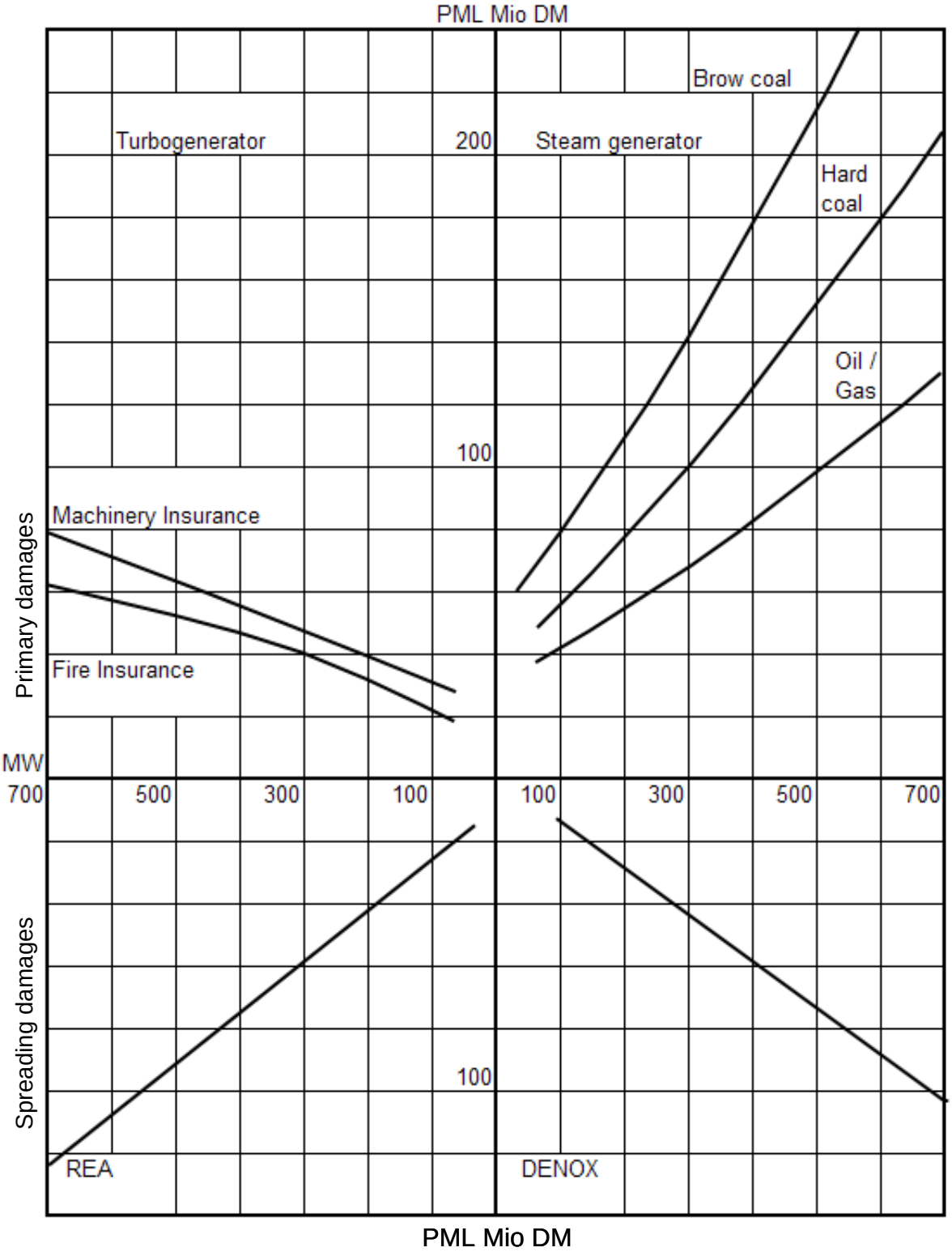
Investment Costs “Steam Generators”
for power ranging between 75 MW up to 700 MW in relation to fuels with a high calorific value.

Encl.
2

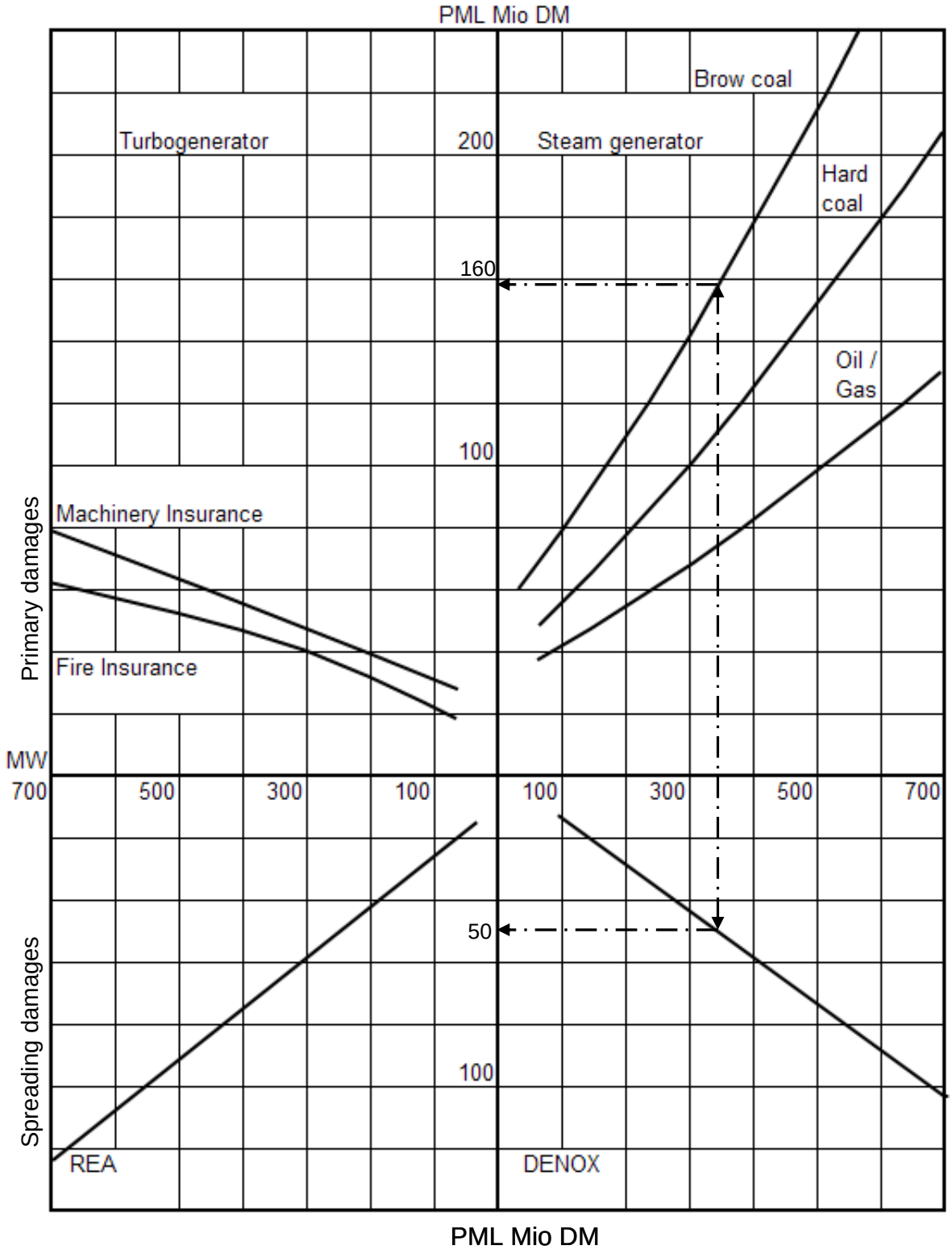


Investment costs “Turbogenerator”
for power production ranging from 75 MW up to 700 MW

Encl.
3.1



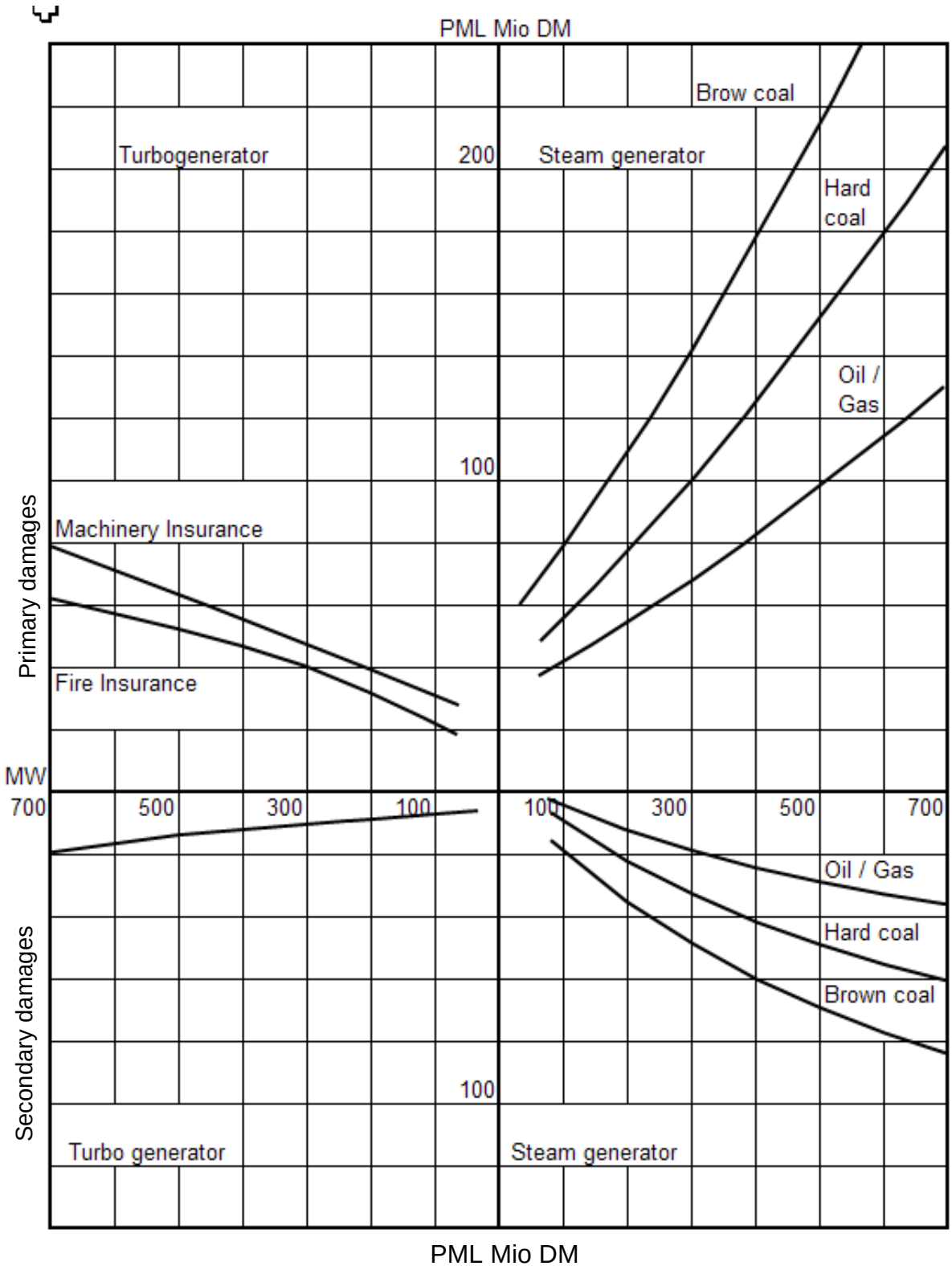
PML Determination for a single block plant
Values for primary and secondary damages



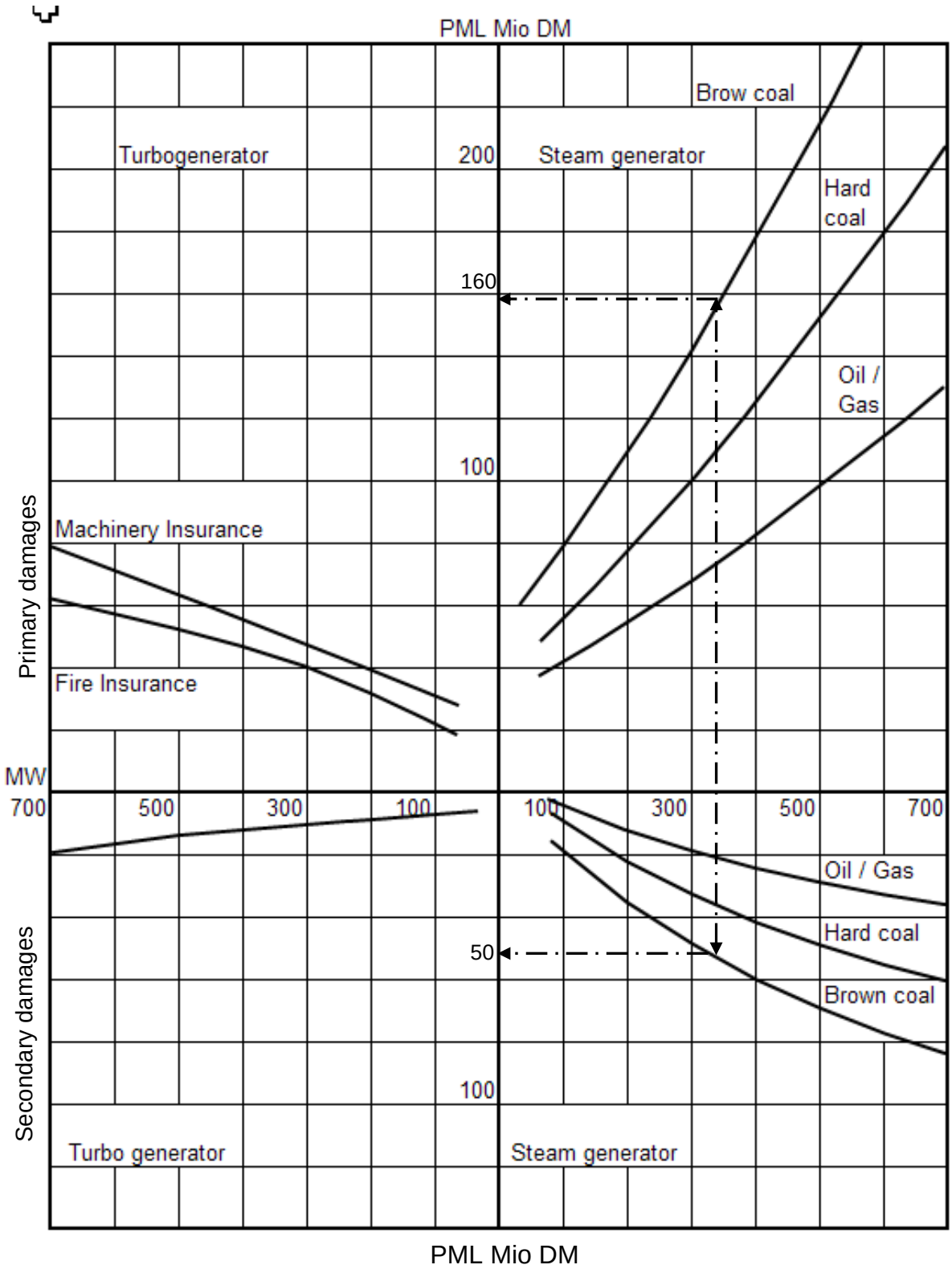
PML Determination for a single block plant
Example 1:

Damage:	**Steam Generator**	**DM 160 Mio**
	DENOX	**DM 50 Mio**
	Building	**DM 30 Mio**
	PML	**DM 240 Mio**

Encl.
4.1

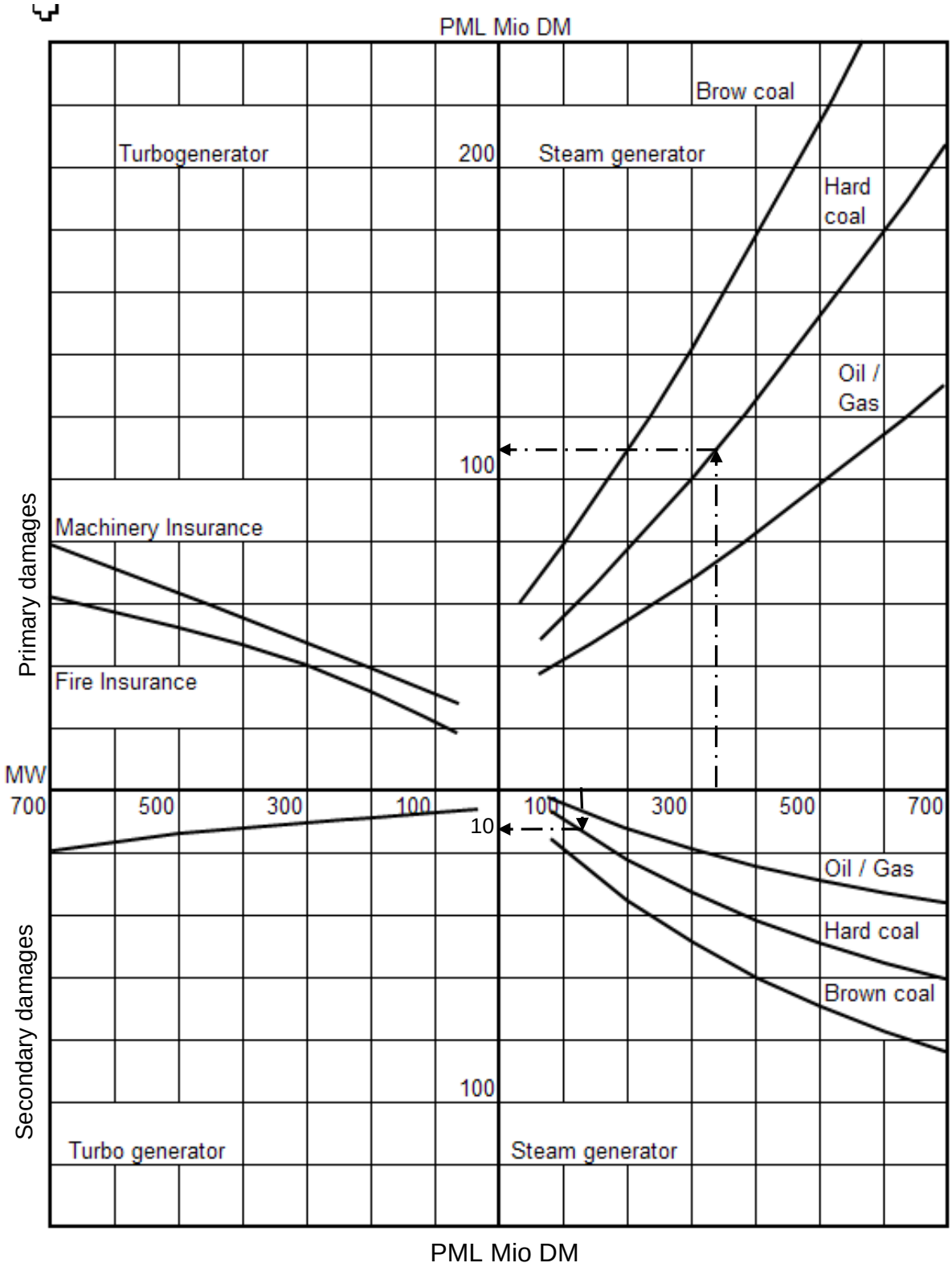


PML Estimate diagram for multi block plants
Values in primary and secondary damages



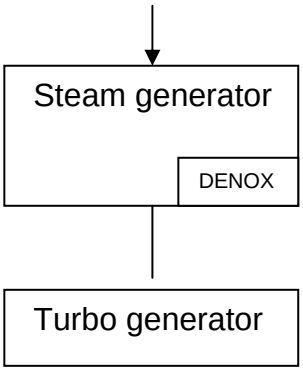
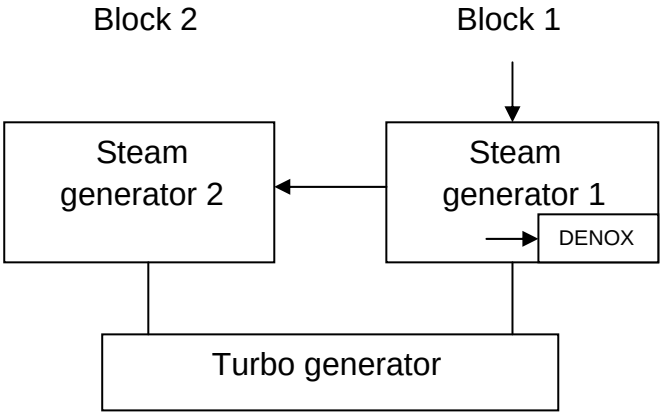
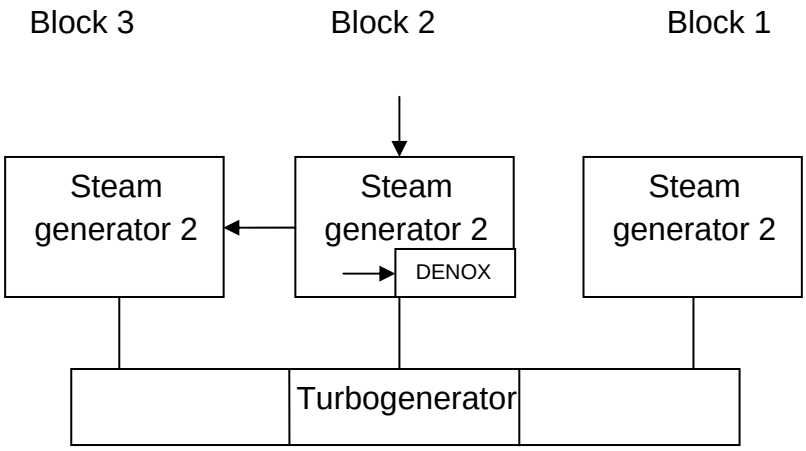
PML Estimate diagram for a multi block plant with 2 blocks
Example 2

Damage:	**Steam generator 1**	**DM 160 Mio**
	DENOX block 1	**DM 50 Mio**
	Steam generator 2	**DM 50 Mio**
	Building	**DM 30 Mio**
	PML	**DM 290 Mio**



PML Estimate diagram for a multi block plant with 2 blocks
Example 2

Damage:	**Steam generator 2**	**DM 100 Mio**
	DENOX block 2	**DM 50 Mio**
	Steam generator 3	**DM 10 Mio**
	Building	**DM 30 Mio**
	PML	**DM 190 Mio**

Example 1 Single block	
Example 2 2 Blocks	
Example 3 3 Blocks	

PML Estimate
Example for secondary damages