

Legislation in the European Union and the impact on existing plant

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Current EU legislation

- **EU member countries must comply with United Nation protocols, European Commission directives and other international protocols**
- **Individual member states may set their own additional national legislation**
- **Main European Commission directive for 2012 onwards is:**

the Industrial Emissions Directive

What does this mean in practice?

All coal-fired units must:

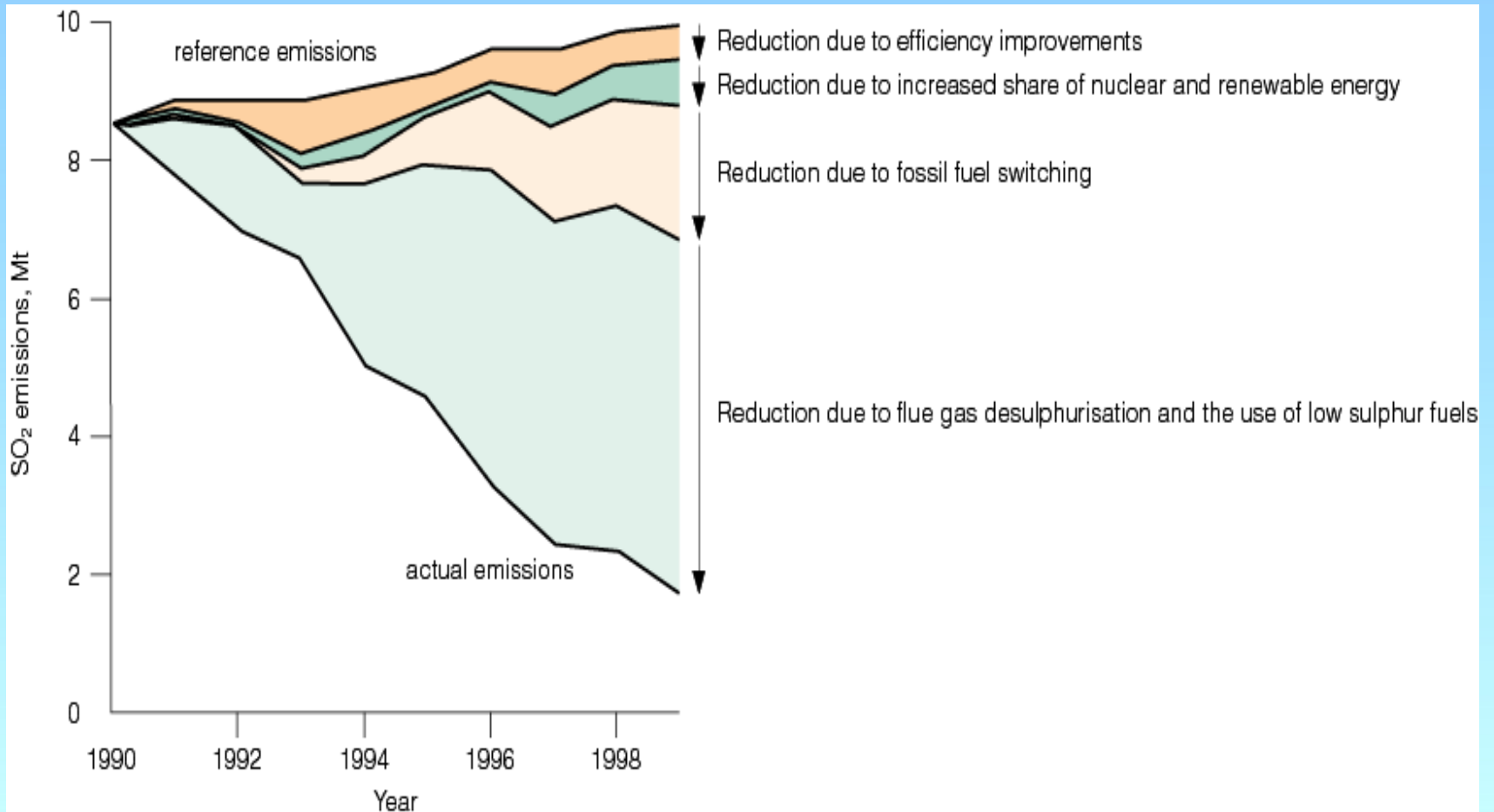
- have efficient particulate controls
- Have flue gas desulphurisation or equivalent technology
($<150\text{-}400 \text{ SO}_2 \text{ mg/m}^3$ or $>92\% \text{ SO}_2$ removal)
- have NOx emissions below $150\text{-}300\text{mg/m}^3$

Plants which cannot meet these limits must:

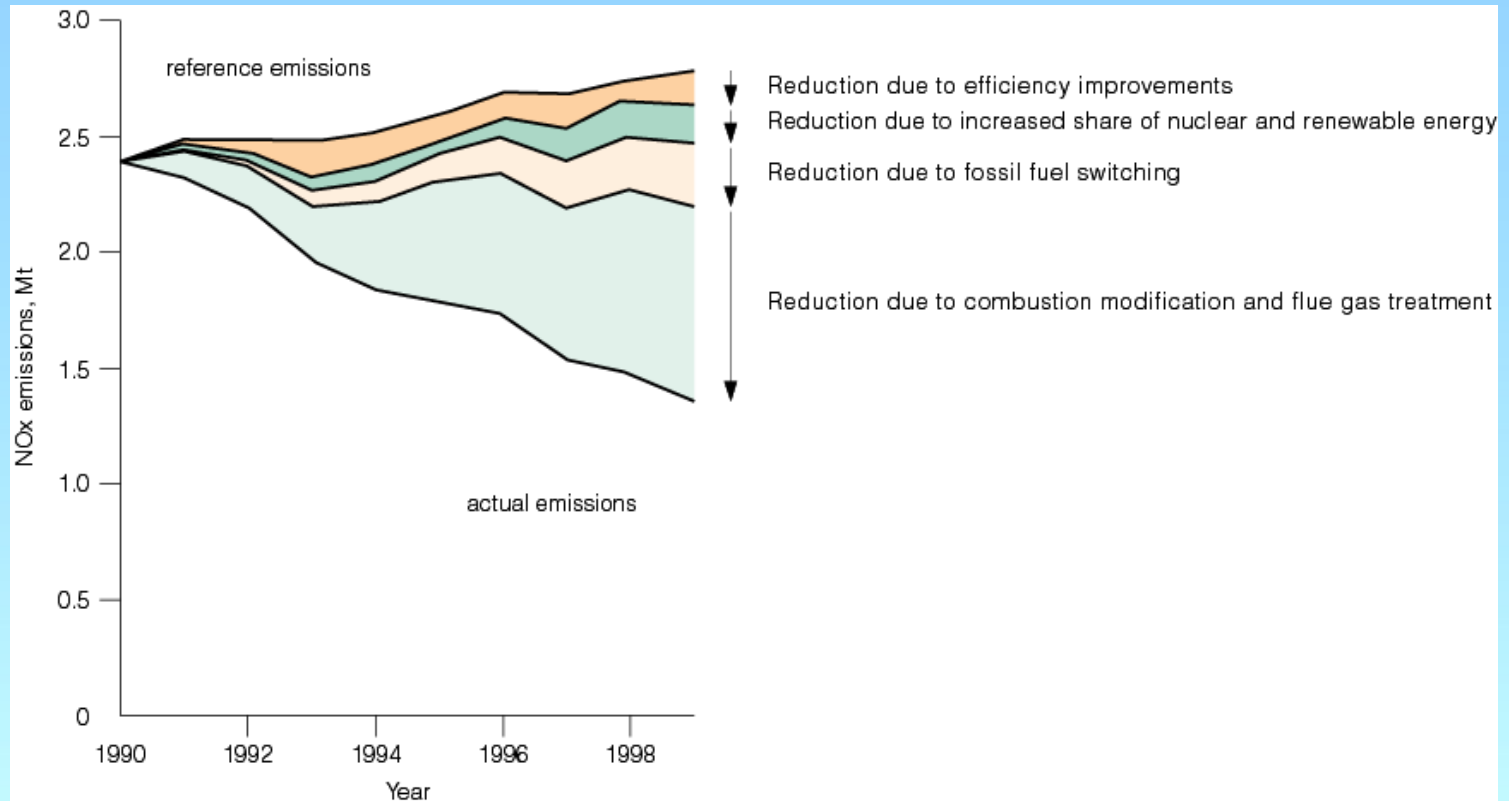
- work under a trading bubble or
- follow limited operation until 2023 and close

significant investment in retrofitting control technologies

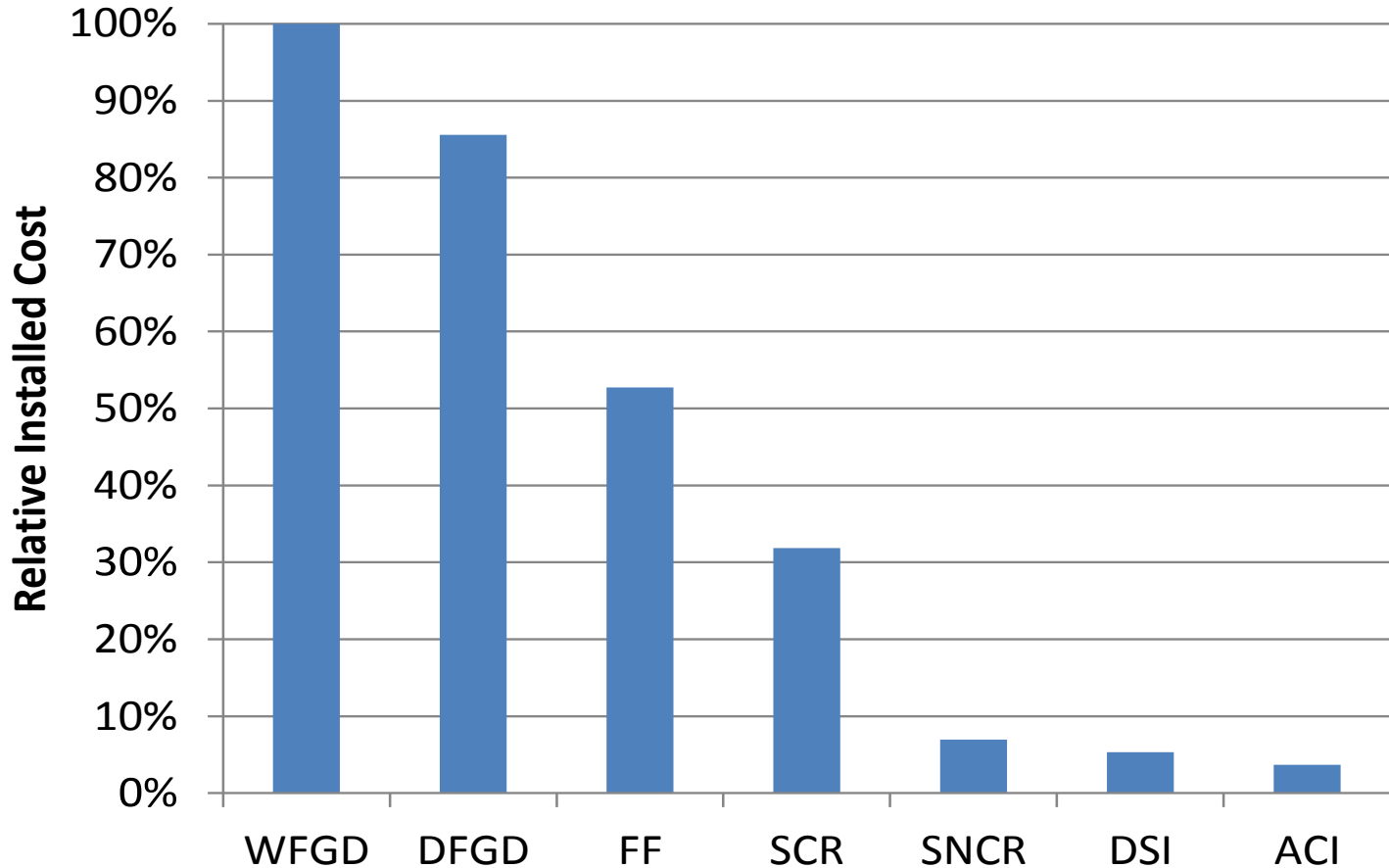
SO₂ emissions from electricity generation in the EU



NOx emission reductions from electricity generation in the EU



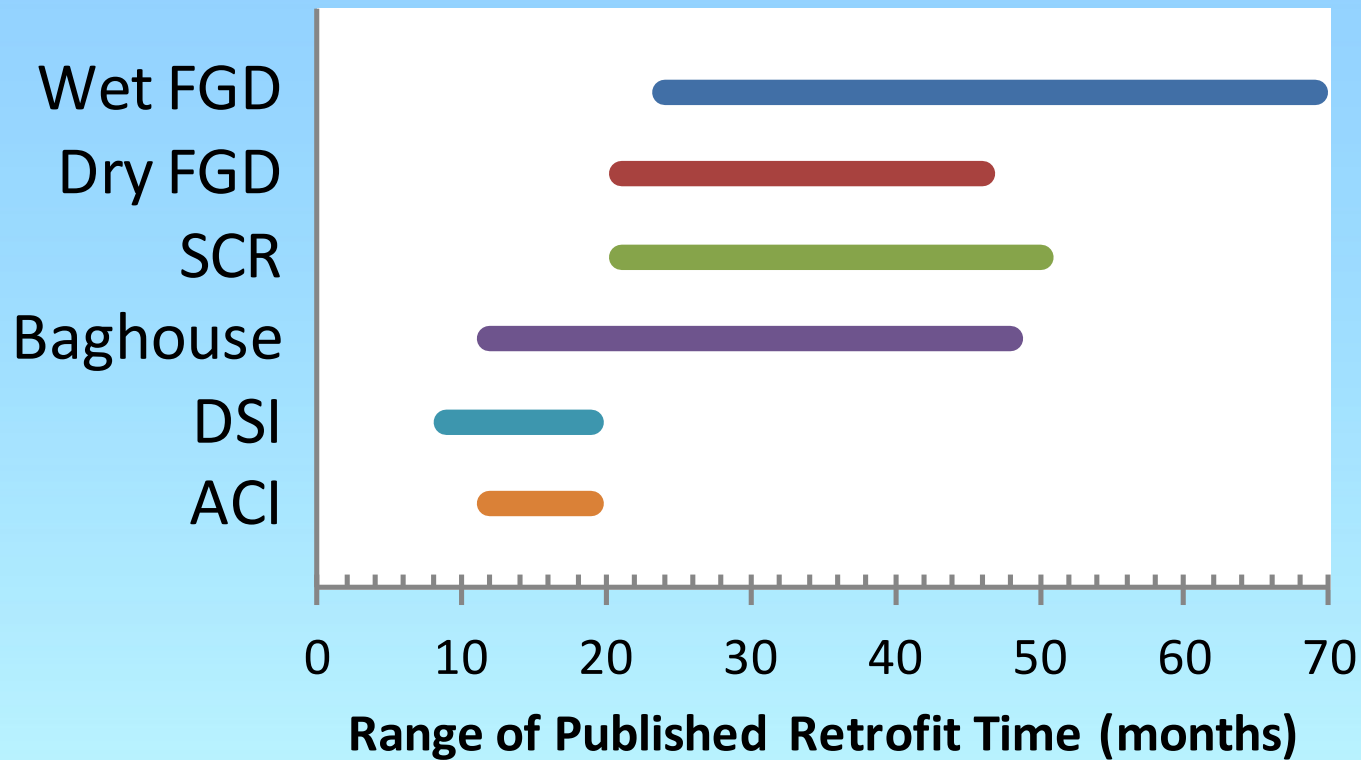
The Cost of Retrofits



FGD: flue gas desulfurization
(scrubber – Wet or Dry)
FF: fabric filter

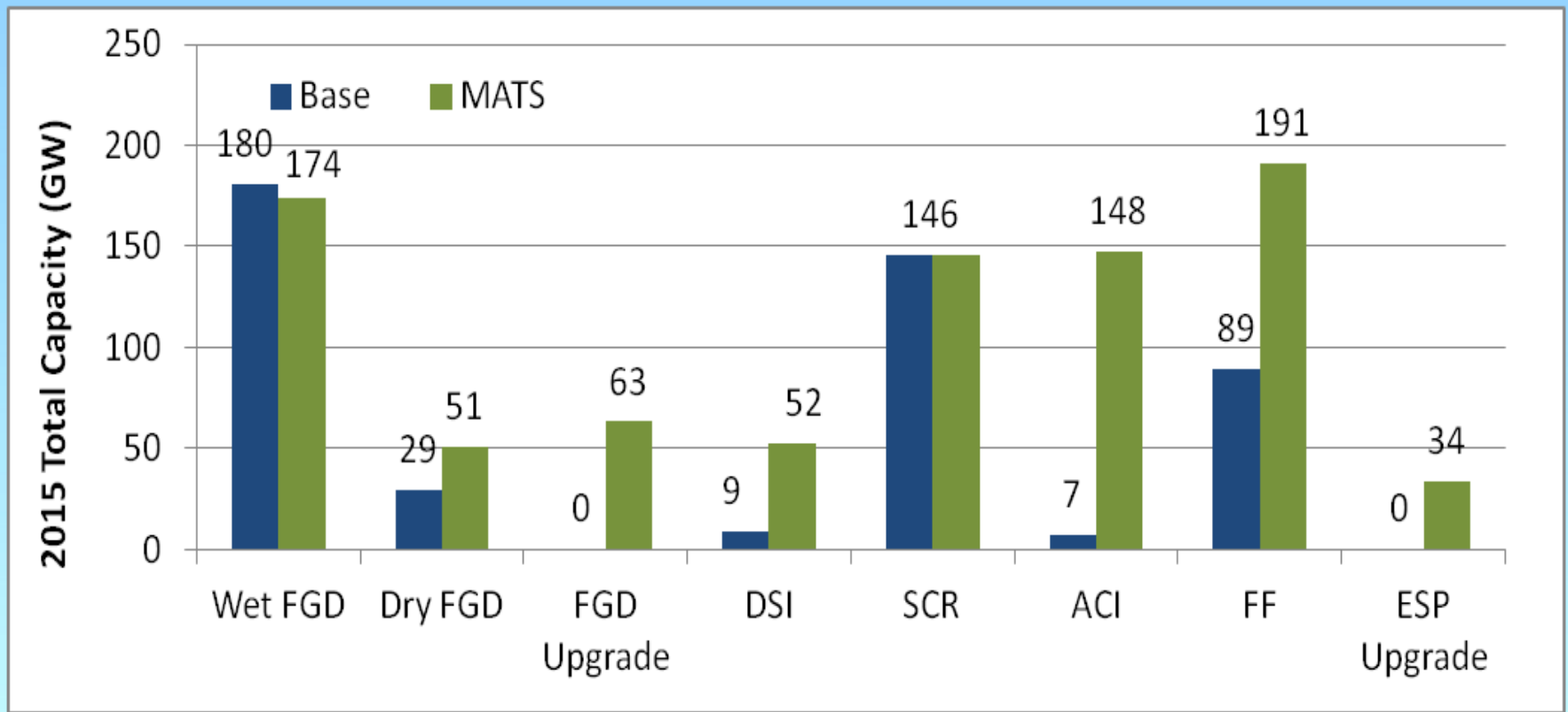
SCR: selective catalytic reduction
SNCR: selective non-catalytic reduction
DSI: dry sorbent injection
ACI: activated carbon injection

Retrofitting takes time



Retrofitting in the USA

New “Mercury and Air Toxics Standard” (MATS) in the USA means that most plants are investing in significant retrofit of control technologies



2012 power plant retrofits worldwide

Equipment type	Installation date	Value (\$billion)	Average Value (\$million)	Number of projects
New ESP	2014	4.9	40	122
ESP upgrades	2013	1.4	20	70
Fabric filters	2014	0.9	40	22
Bag replacement	2012	0.2	0.4	500
FGD upgrade	2014	1.2	20	60
New FGD	2015	7.8	60	130
SCR systems	2014	4.0	40	100
Catalyst	2012	1.5	2	750
Total		21.9	222.4	1,754

Environews 2012

Many commercial companies provide flue gas controls such as FGD

Alstom

BHEL

Formosa

Fuji

Hitachi

Hyundai

Shanghai

B&W

BWE

Rafako

GE

Wuhan

IHI

Siemens

Babcock Power

Conoco

Foster Wheeler

Harbin

Babcock Hitachi

MHI

PJSC EM Alliance

New mercury legislation

- **Reduction requirements in Canada are challenging – some fuel switching and coal plant closures as well as investment in control systems**
- **Reduction requirements in the USA under the Mercury and Air Toxics Standard are challenging – some coal closures and significant expenditure on control technologies**
- **UNEP (United Nations Environment Programme) global legally binding instrument on mercury**

Situation in the EU on mercury

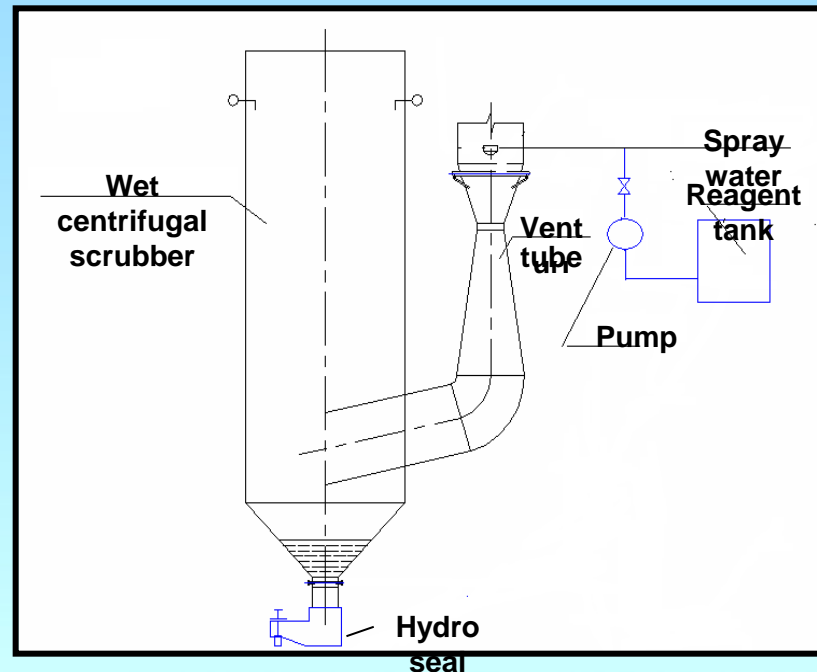
- **The new IED only requires annual monitoring for mercury**
- **The IED requires the use of BAT - best available technology**
- **Current BAT for particulates, SO₂ and NO_x may reduce Hg by “co-benefit” effects (up to 70- 80%)**
- **It is unclear whether this will be enough to control mercury in the EU to potential new UNEP (United Nations Environment Programme) requirements**

Economic mercury control - demonstrations in Russia



Centrifugal Wet Scrubbers

- **Typical performance**
 - **92 to 95% PM removal**
 - **20 to 25% total mercury removal**



Simple Modifications

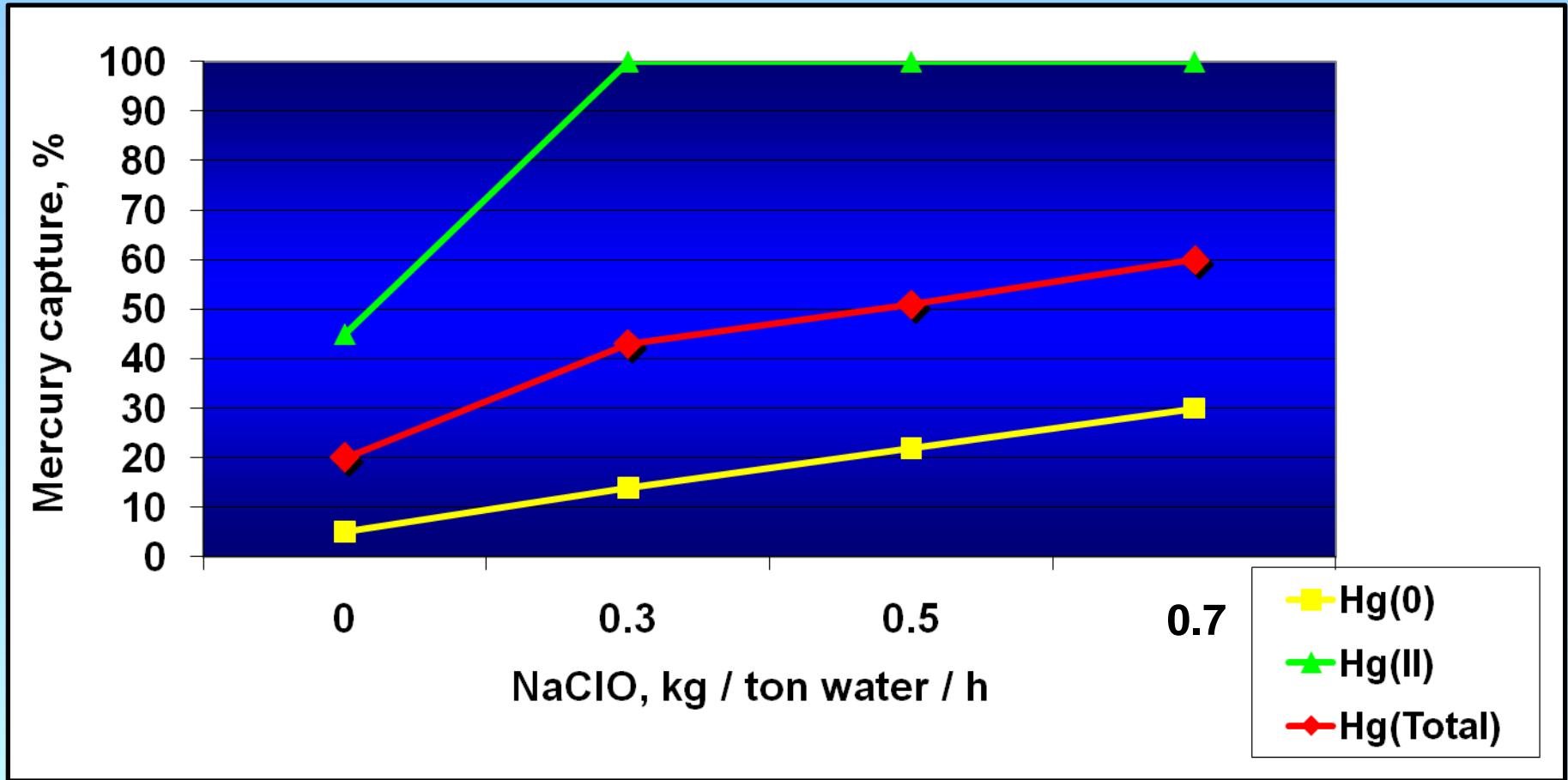
Reagent tank

Pump

Spray water



Improved Mercury Removal



Conclusions

- **The EU has updated legislation for coal-fired units**
- **The new legislation (IED) will effectively require DeNOx and FGD on all plants**
- **Those that cannot comply must close by 2023**
- **Mercury legislation will come next**
- **Many plants in the EU are too old to merit investment in control technologies - coal capacity will be reduced significantly in many countries in the EU in the short-term future**
- **Investment is needed in efficient and clean new build plants as well as retrofitting to older units**

Thank you for listening

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