# Command-and-Control Environmental Policies

David Possen
DIS Environmental Economics

# Plan for the day

| | |
|---|---|
| 4:25 – 4:55 | Exercise on MD & MAC curves |
| 4:55 – 5:15 | This short lecture |
| 5:15 – 5:45 | Exercise on command-and-control policies |

# Plan of this lecture

1. Three types of standards
2. Benefits/drawbacks of standards
3. Three recent examples

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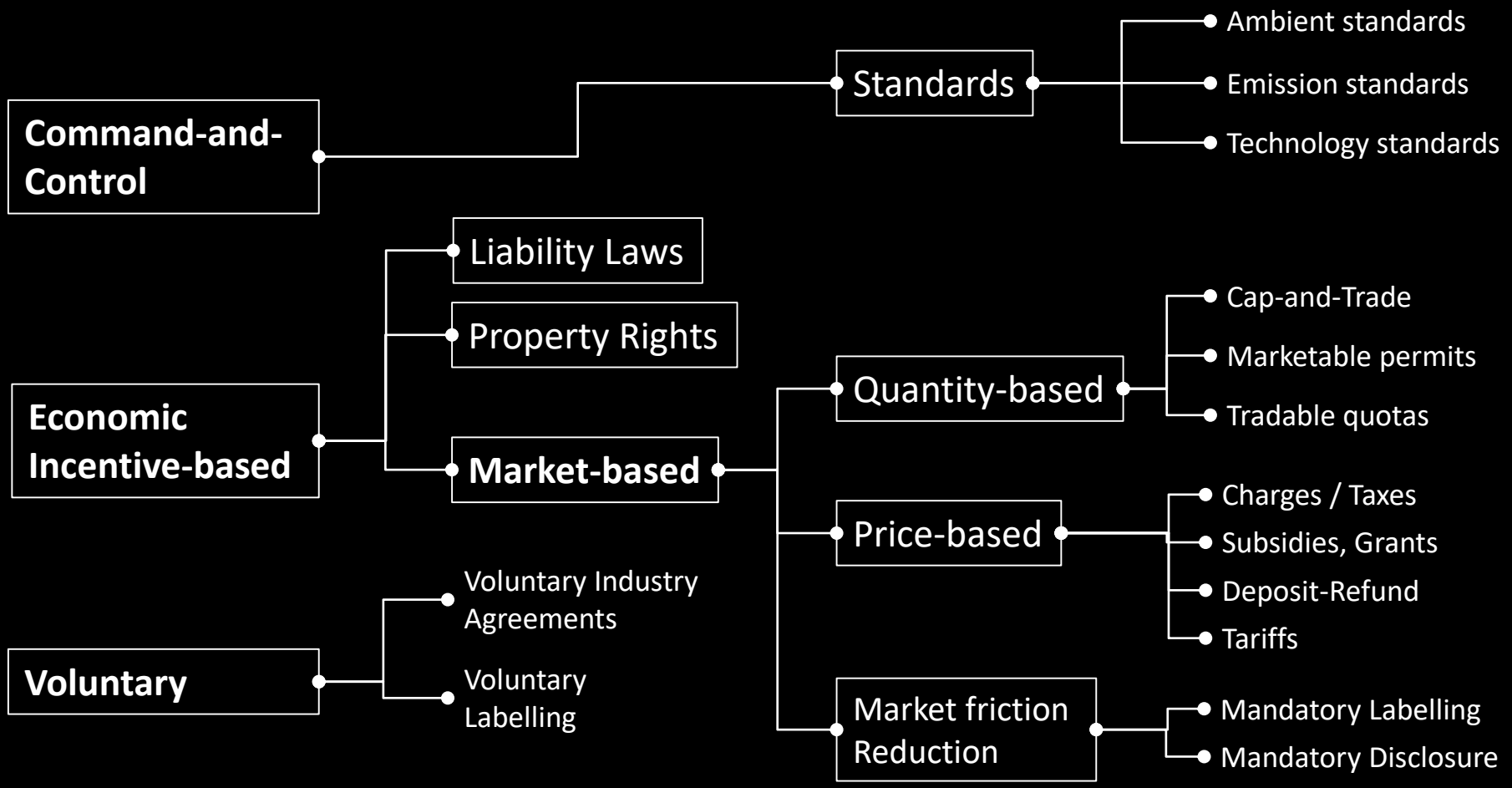

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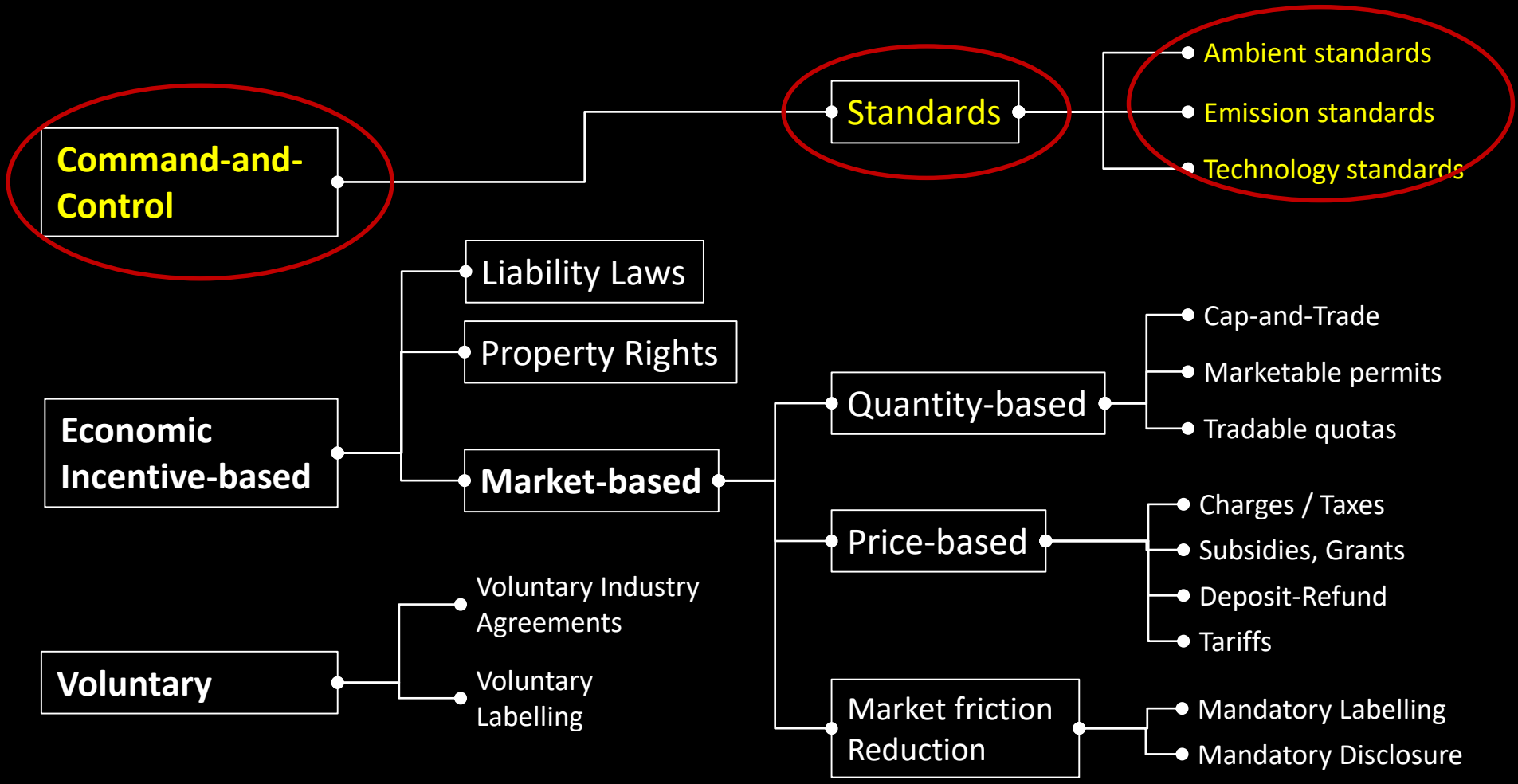

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Example: 1974 National Maximum Speed Law

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Standards seem

simple,

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but are more complicated than they appear …

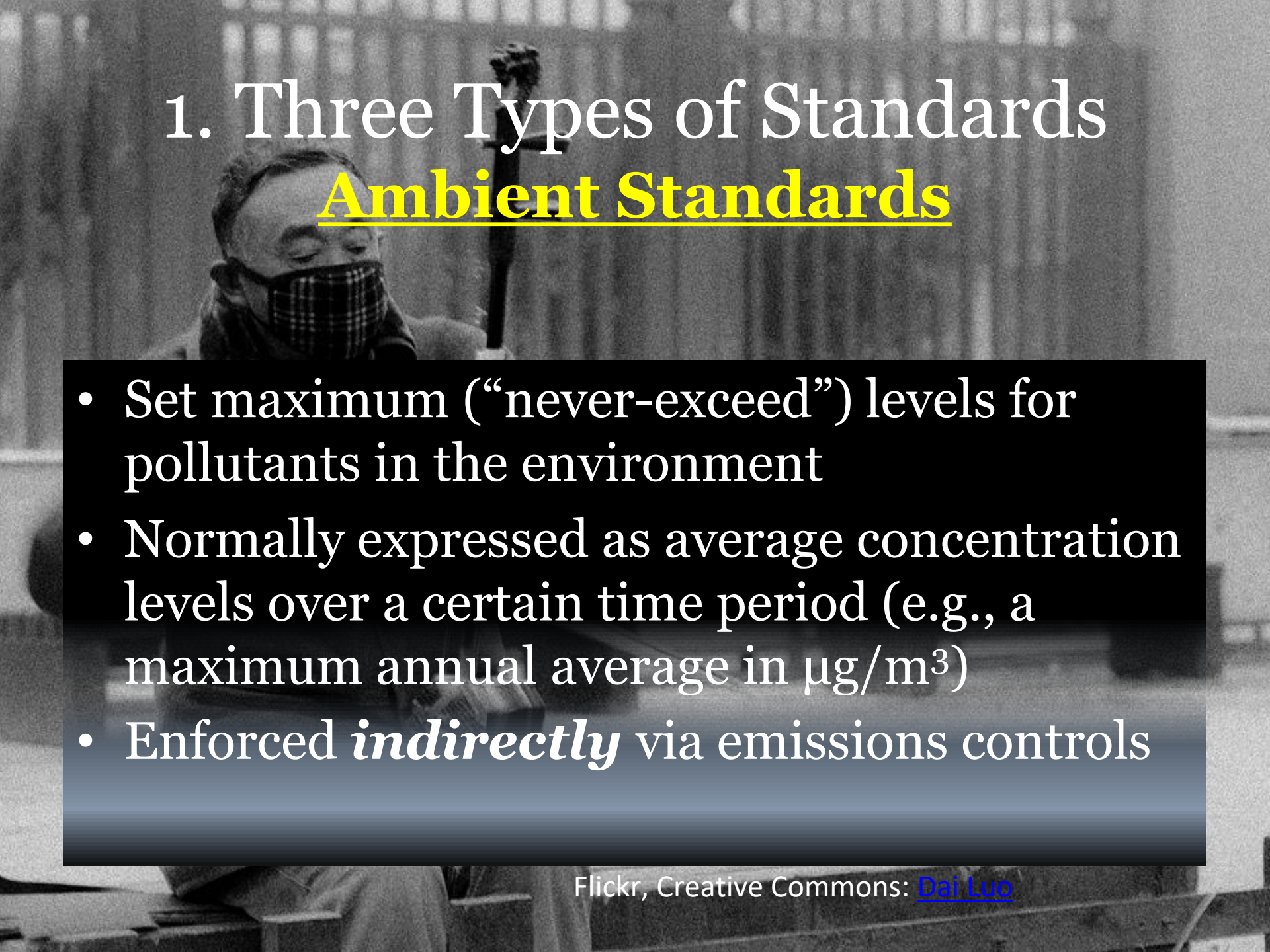
# 1. Three Types of Standards

## Ambient Standards

Flickr, Creative Commons: Dai Luo

# 1. Three Types of Standards
## Ambient Standards

- Set maximum ("never-exceed") levels for pollutants in the environment
- Normally expressed as average concentration levels over a certain time period (e.g., a maximum annual average in $\mu g/m^3$)
- Enforced ***indirectly*** via emissions controls



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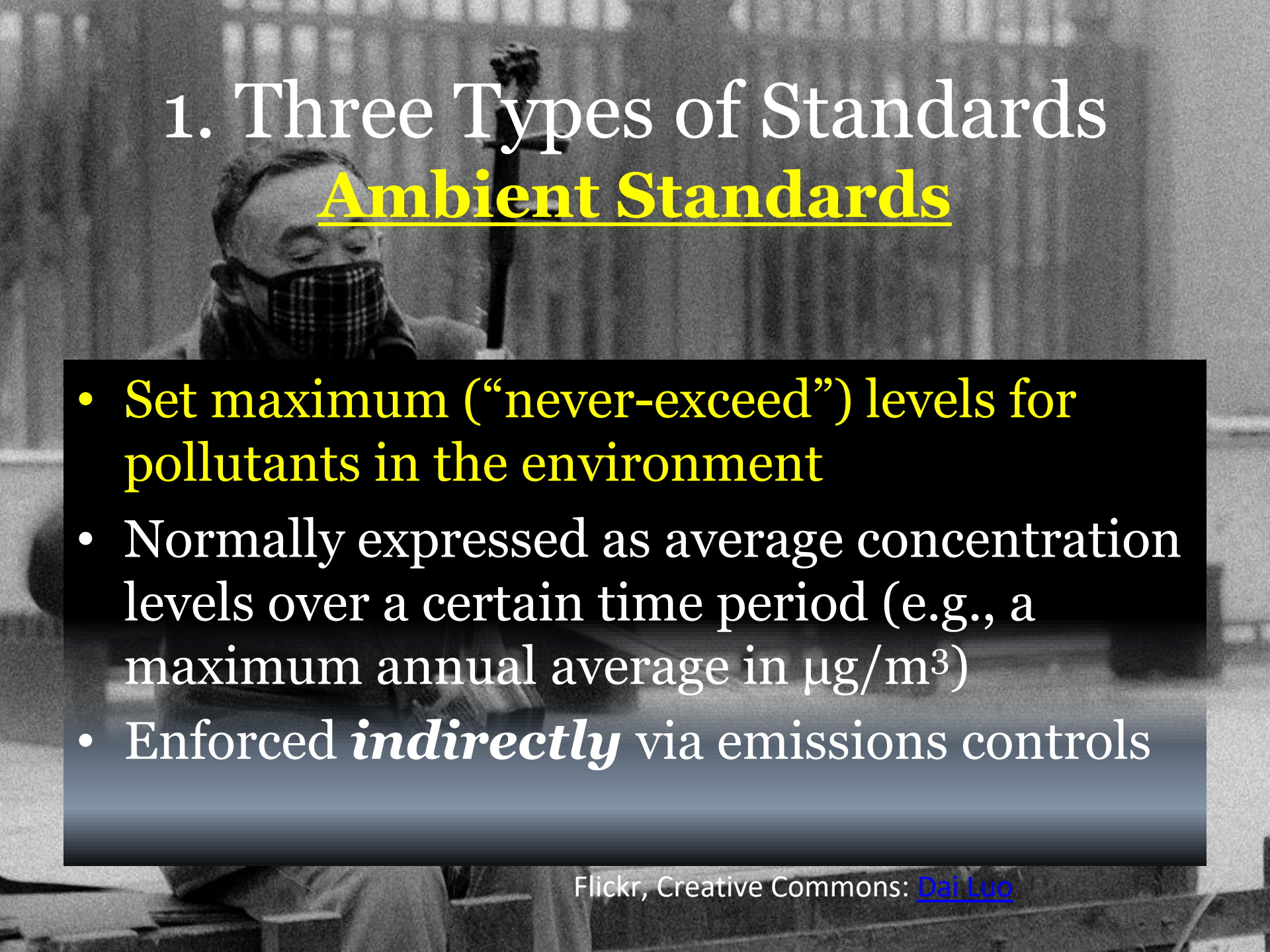

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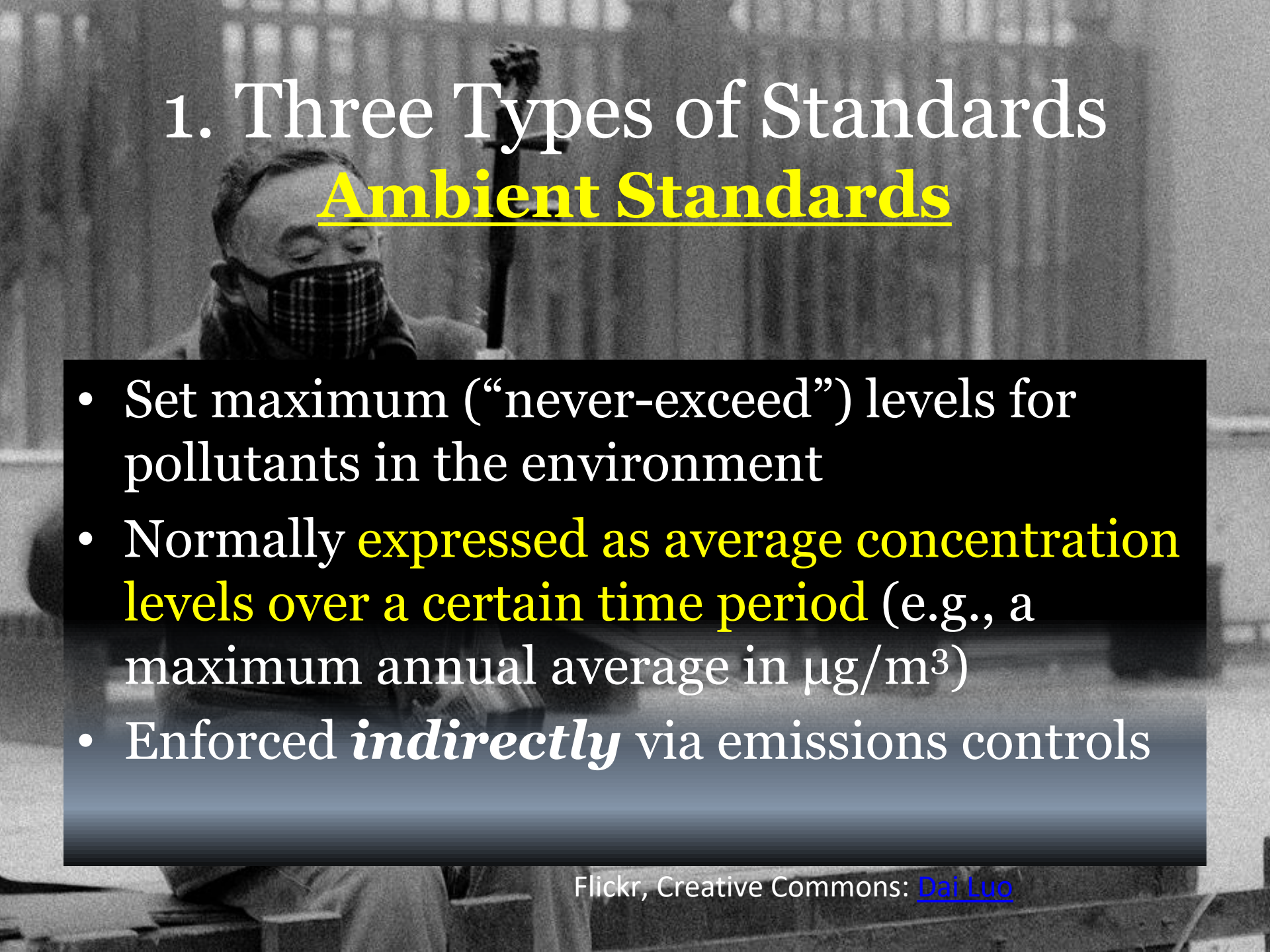

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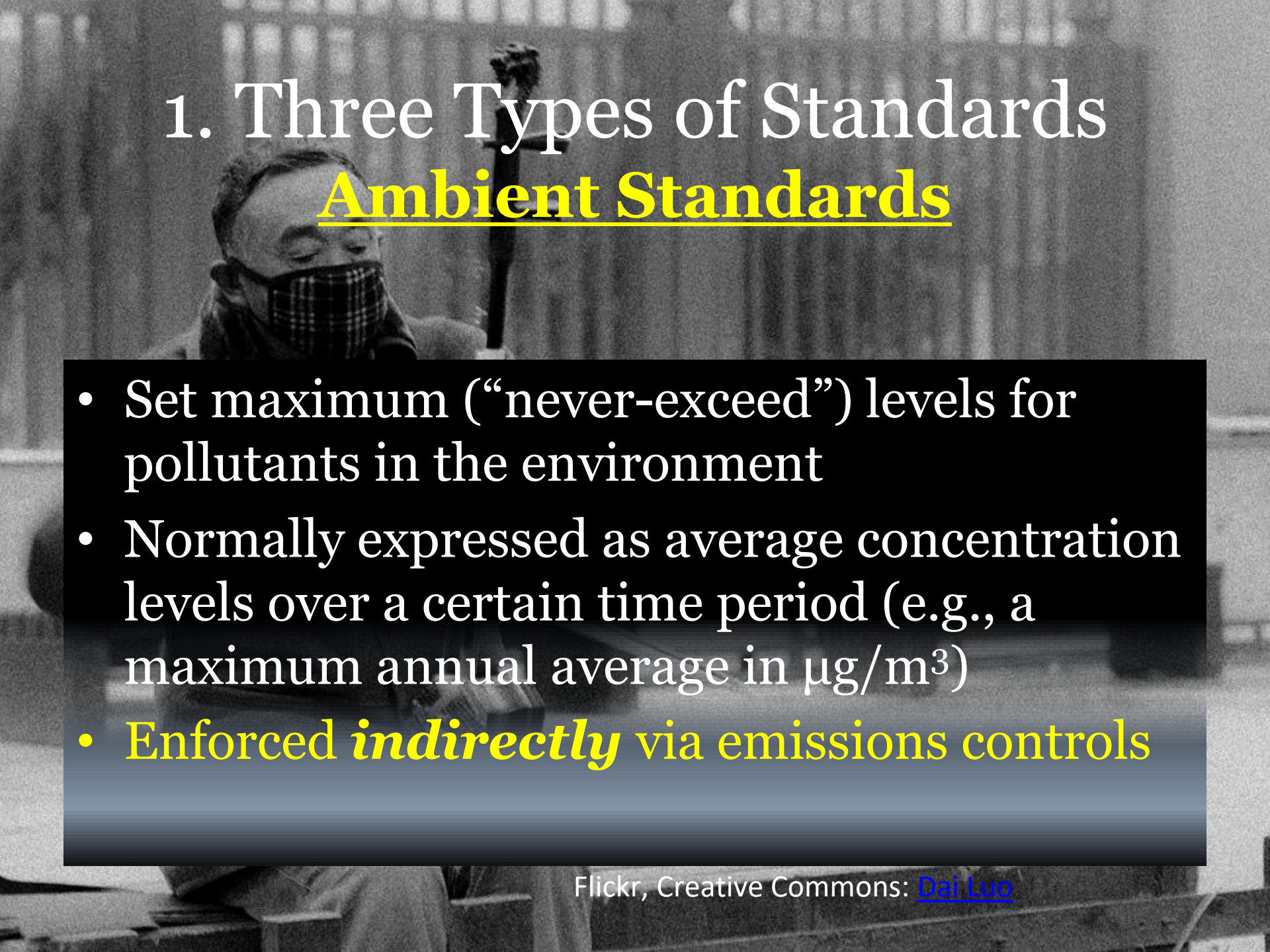

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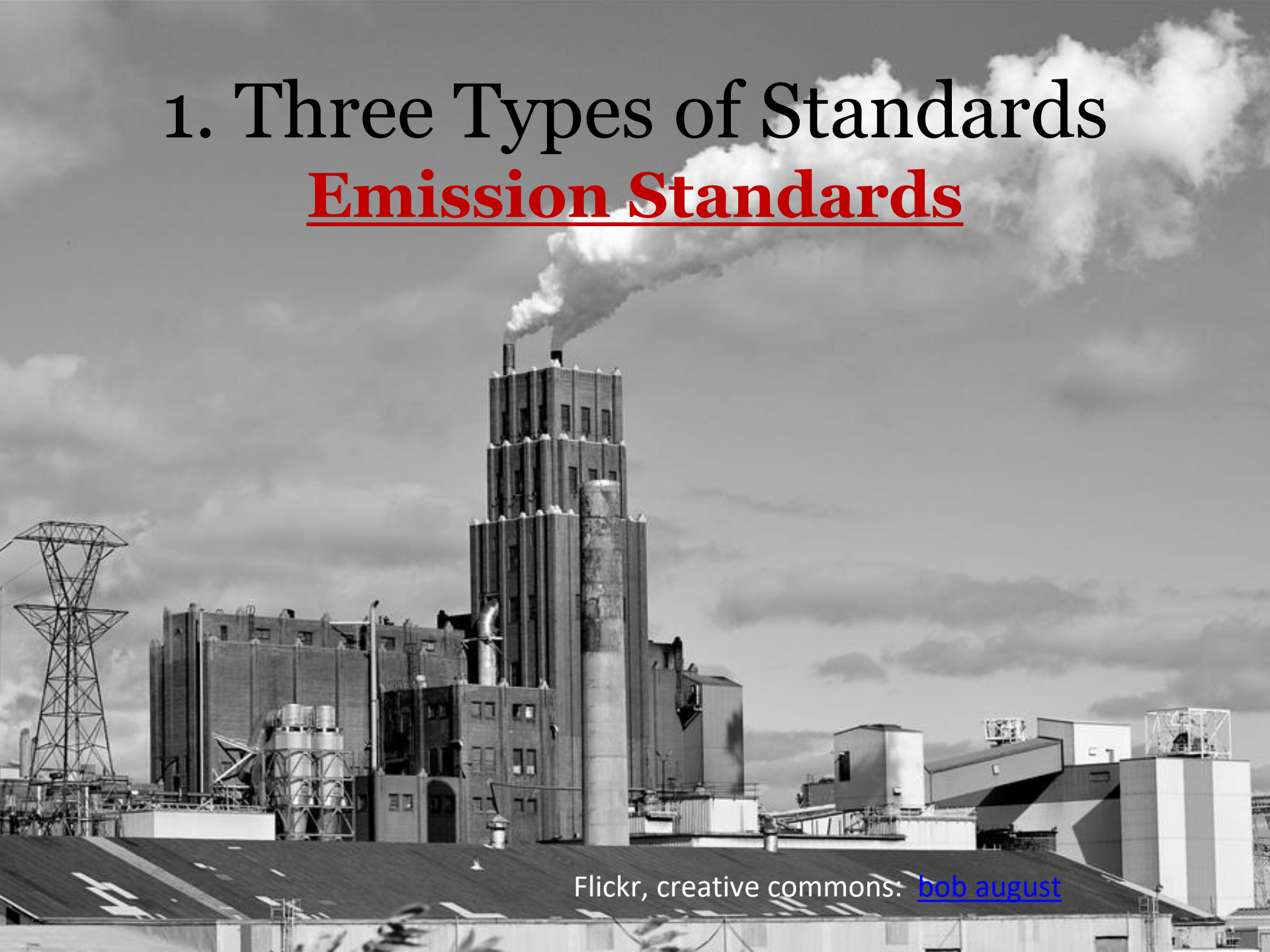
# 1. Three Types of Standards

## Emission Standards



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## Emission Standards

- Set maximum levels for polluting sources
- Expressed as quantity of emissions per unit of time, e.g., $SO_2$ / ton of coal burned per week
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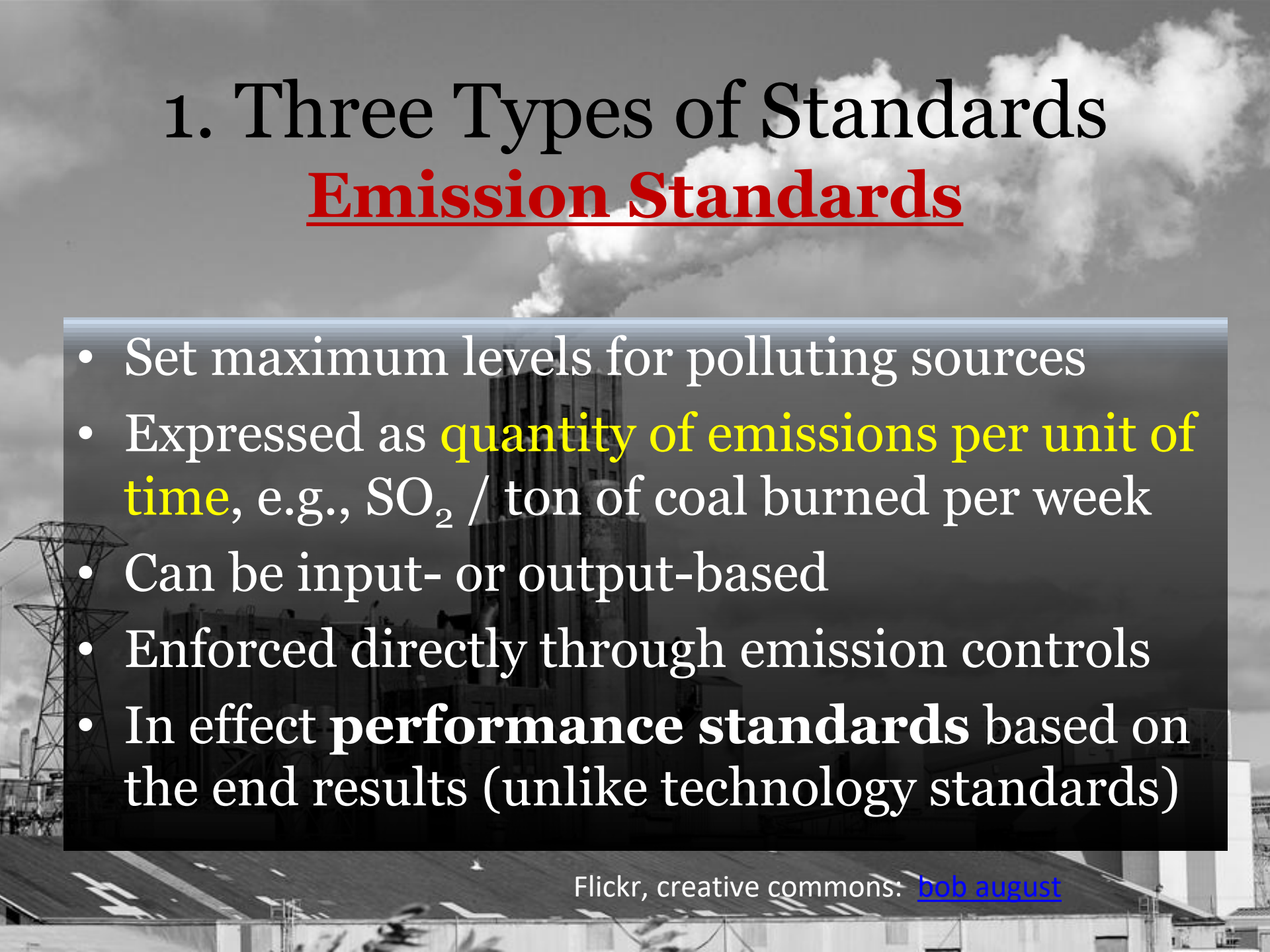

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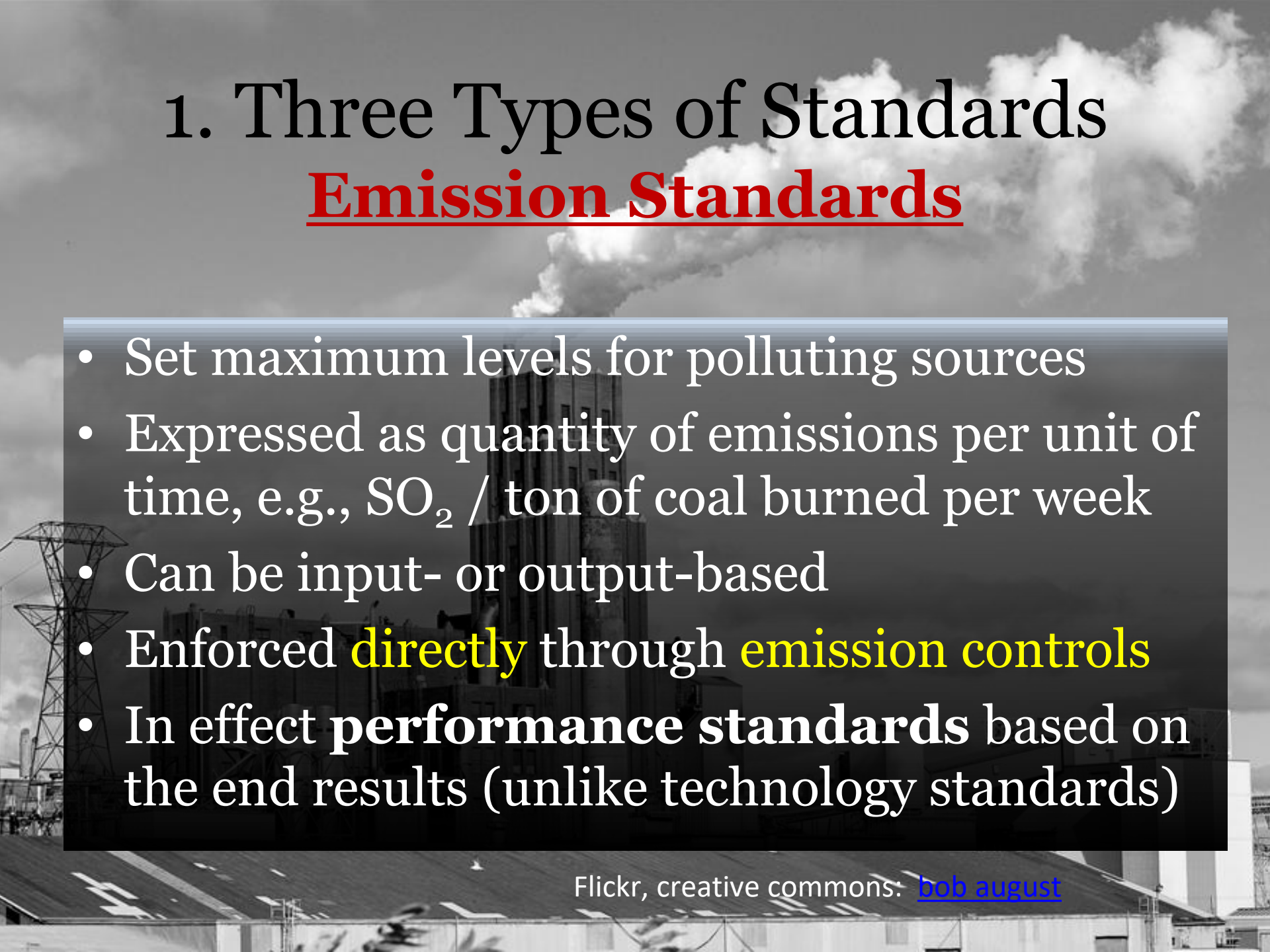

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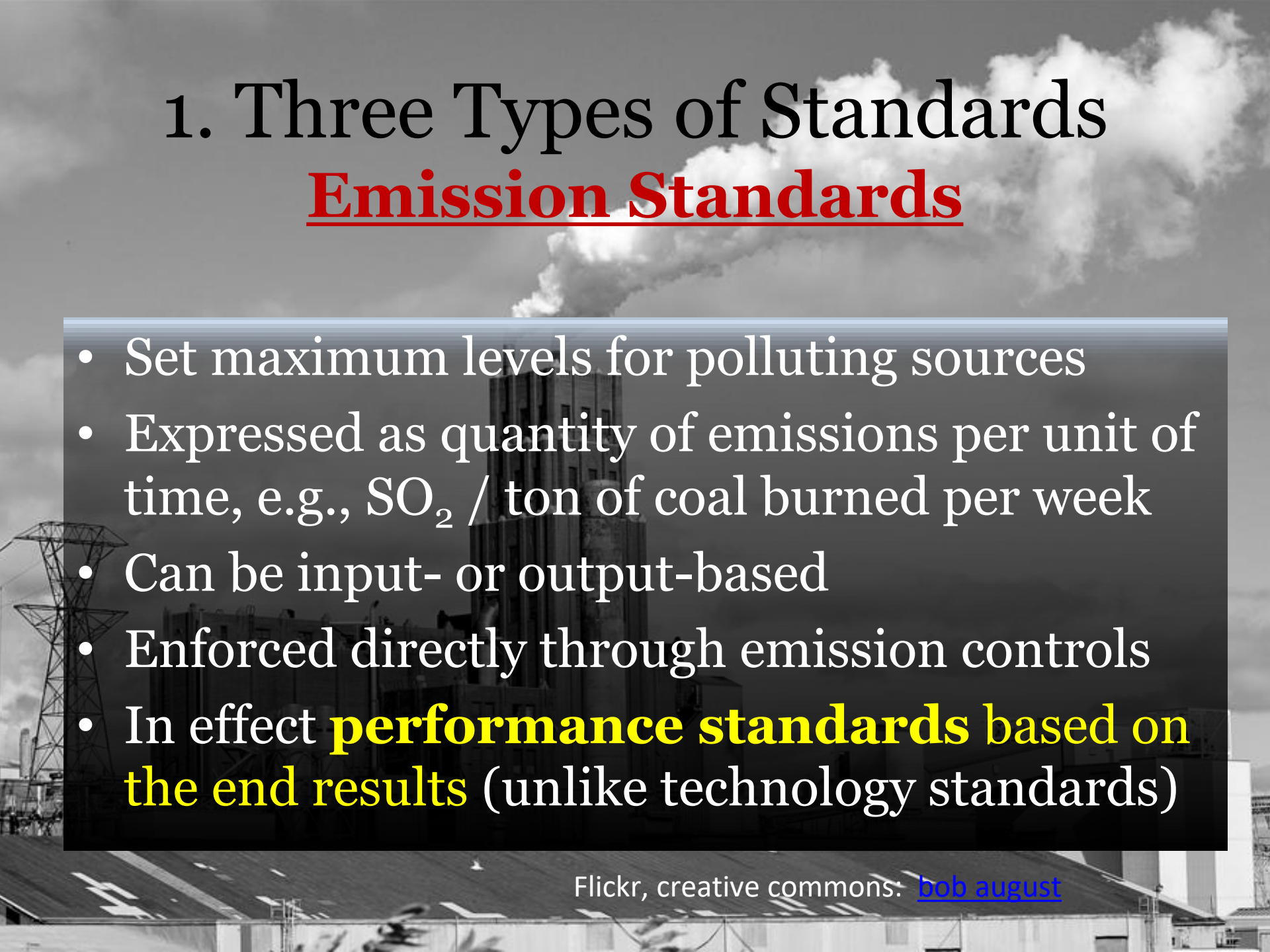

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# 1. Three Types of Standards

## Technology Standards

Flickr, creative commons: Massachusetts Dept. of Environmental Protection

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## Technology Standards

- Specify the technologies or practices to be adopted—e.g., three-way catalytic converters required by the EU since 1991
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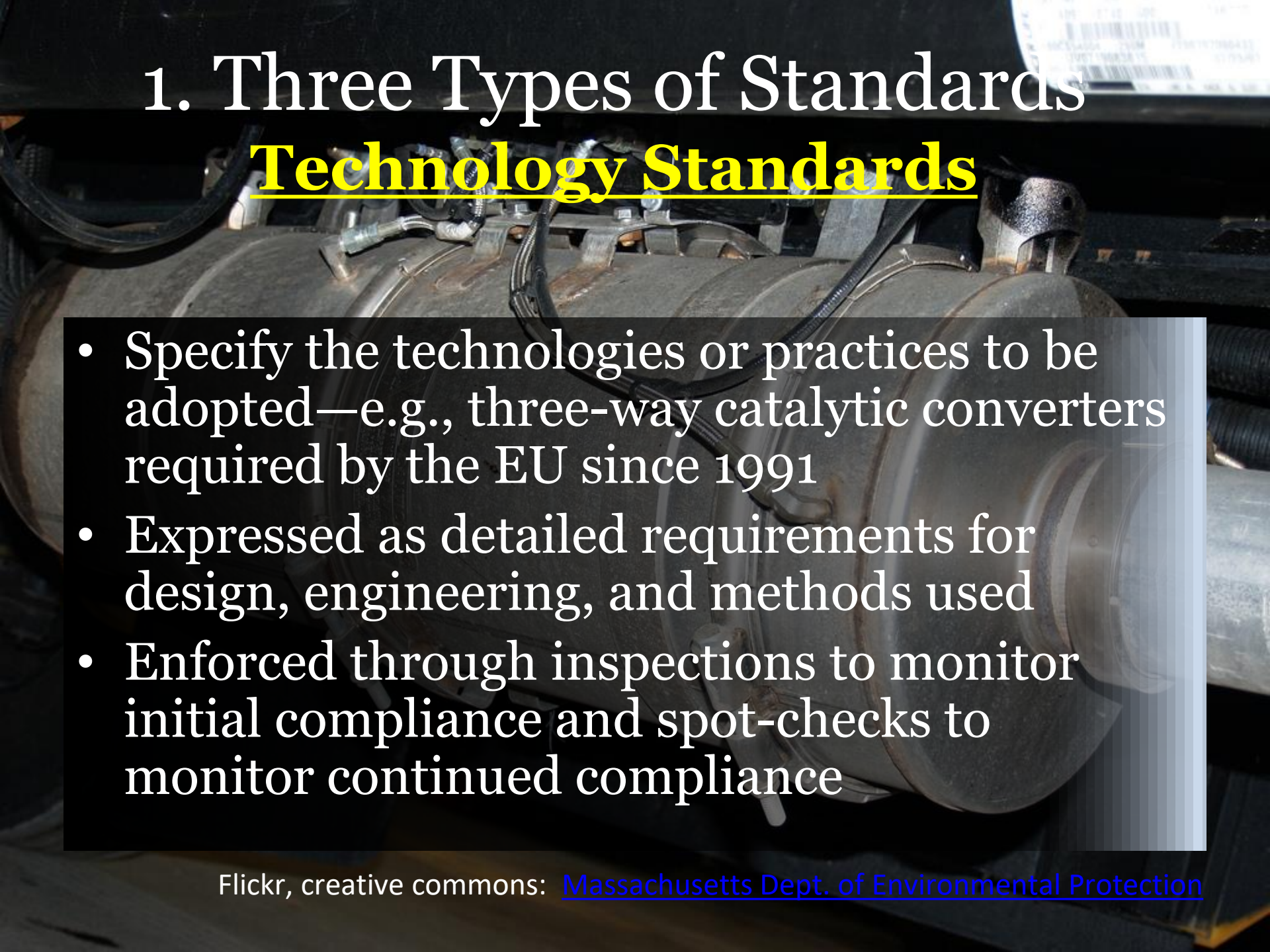
- Enforced through inspections to monitor initial compliance and spot-checks to monitor continued compliance



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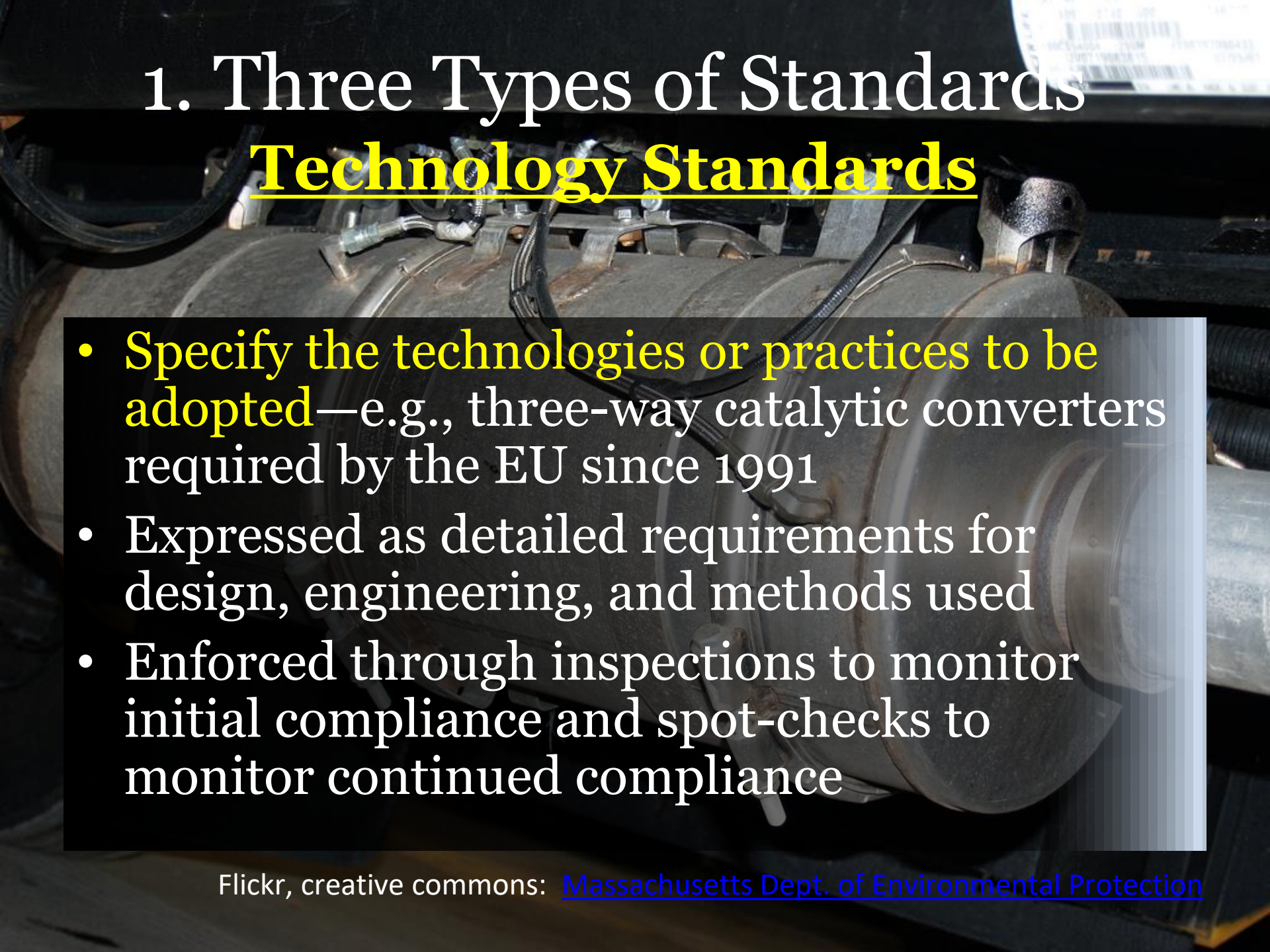

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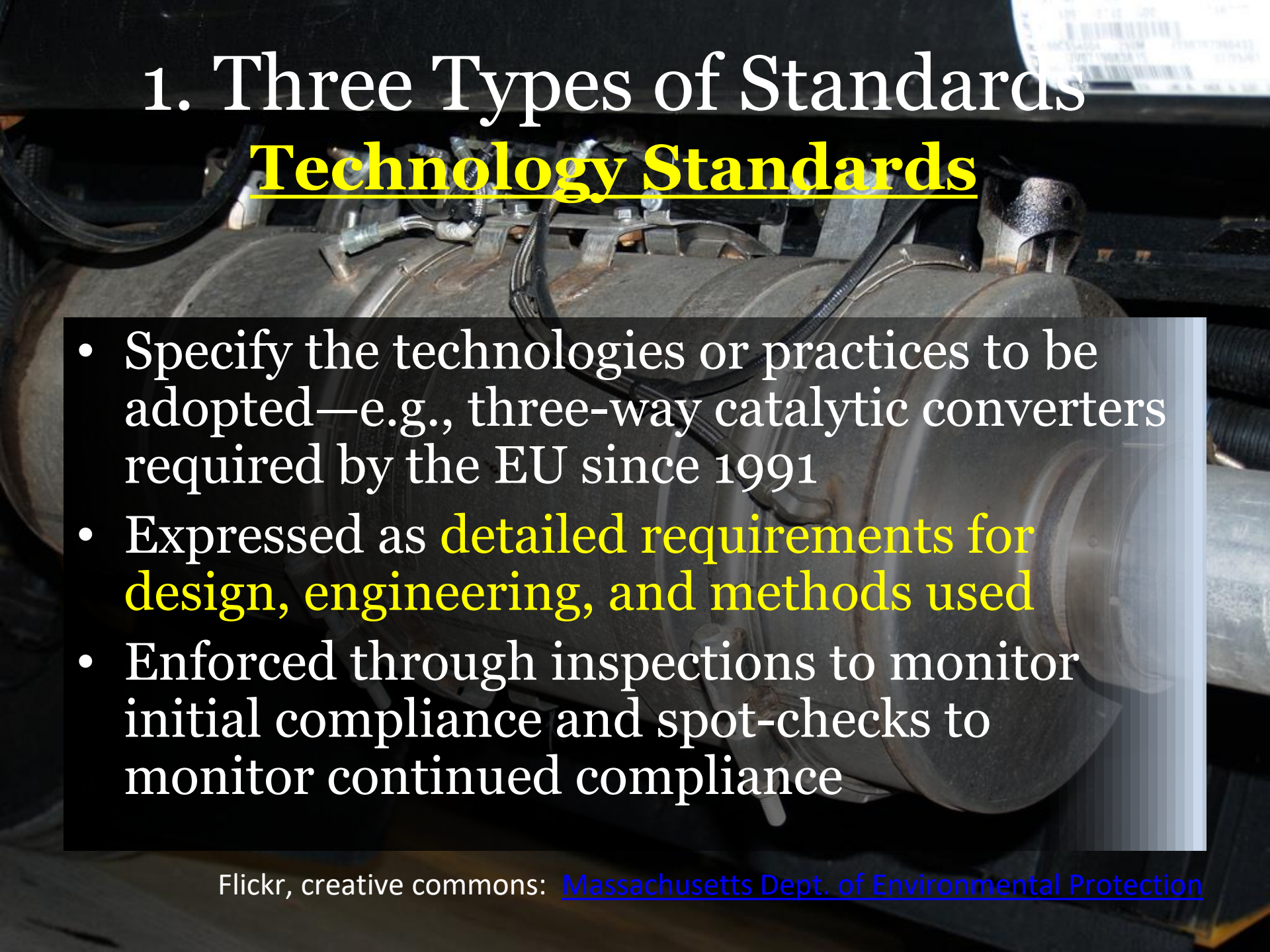

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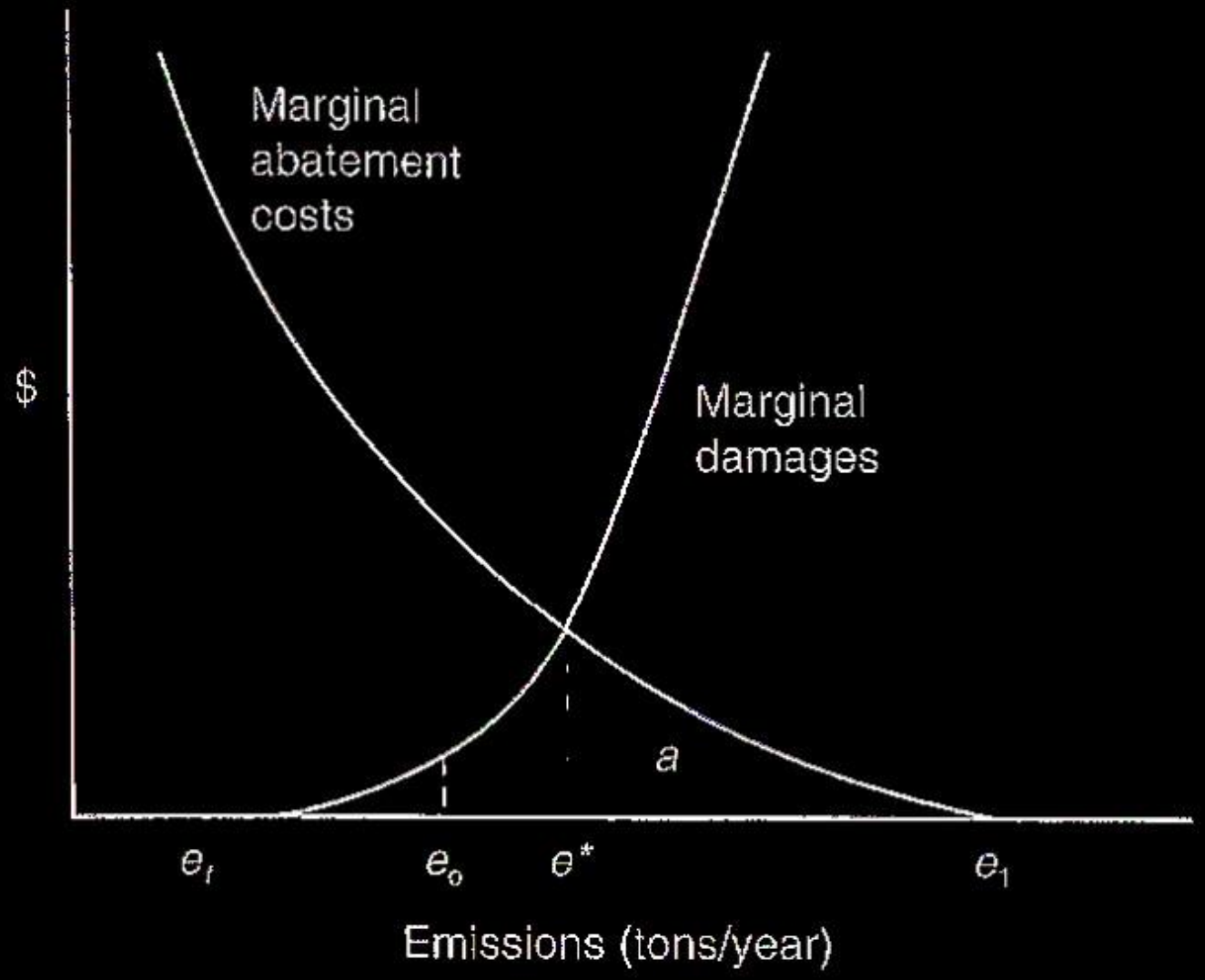
# Plan of this lecture

1. Three types of standards
2. Benefits/drawbacks of standards
3. Three recent examples

# 2. Benefits/drawbacks of standards



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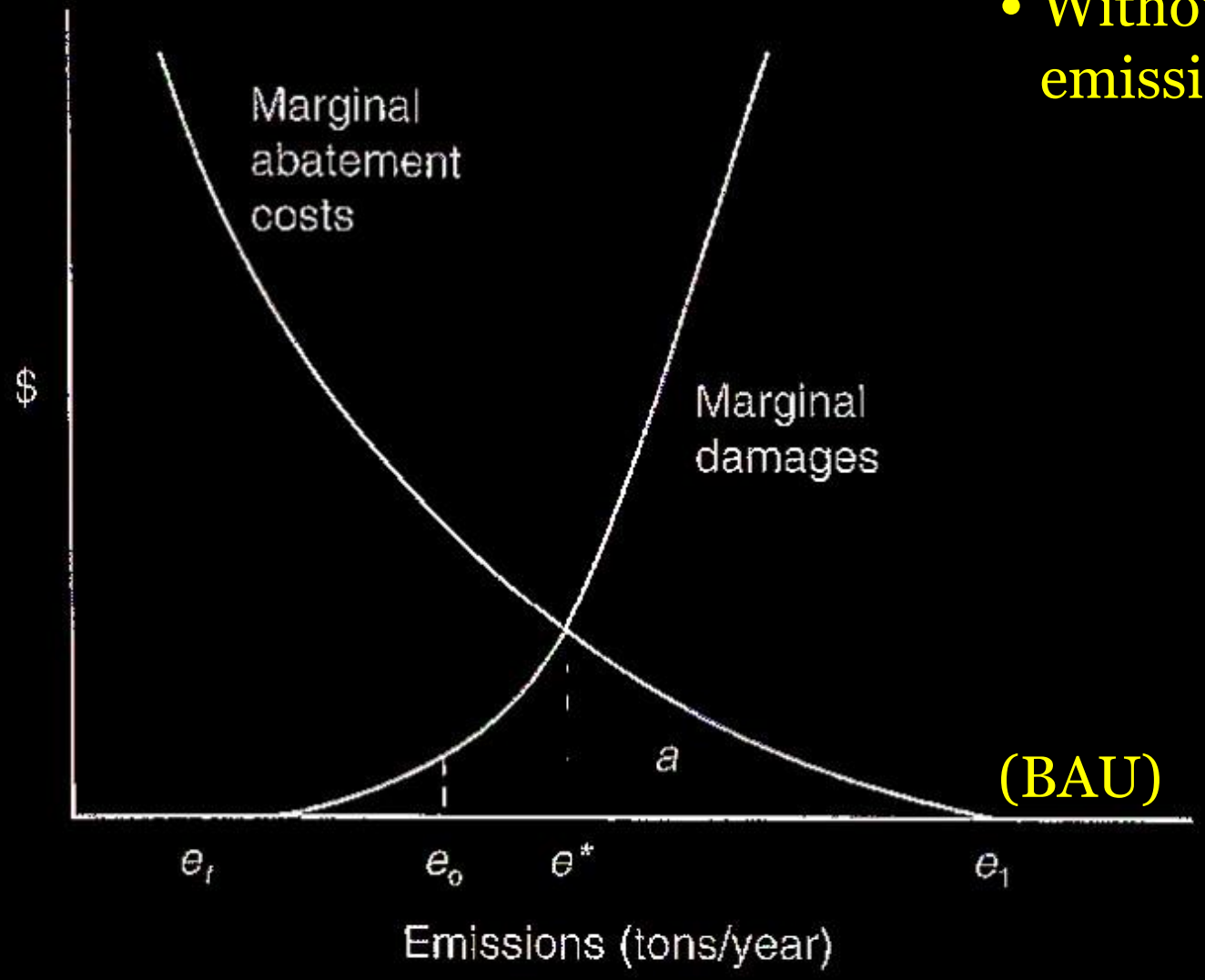


- Without the standard, emissions would be at $e_1$ (BAU)

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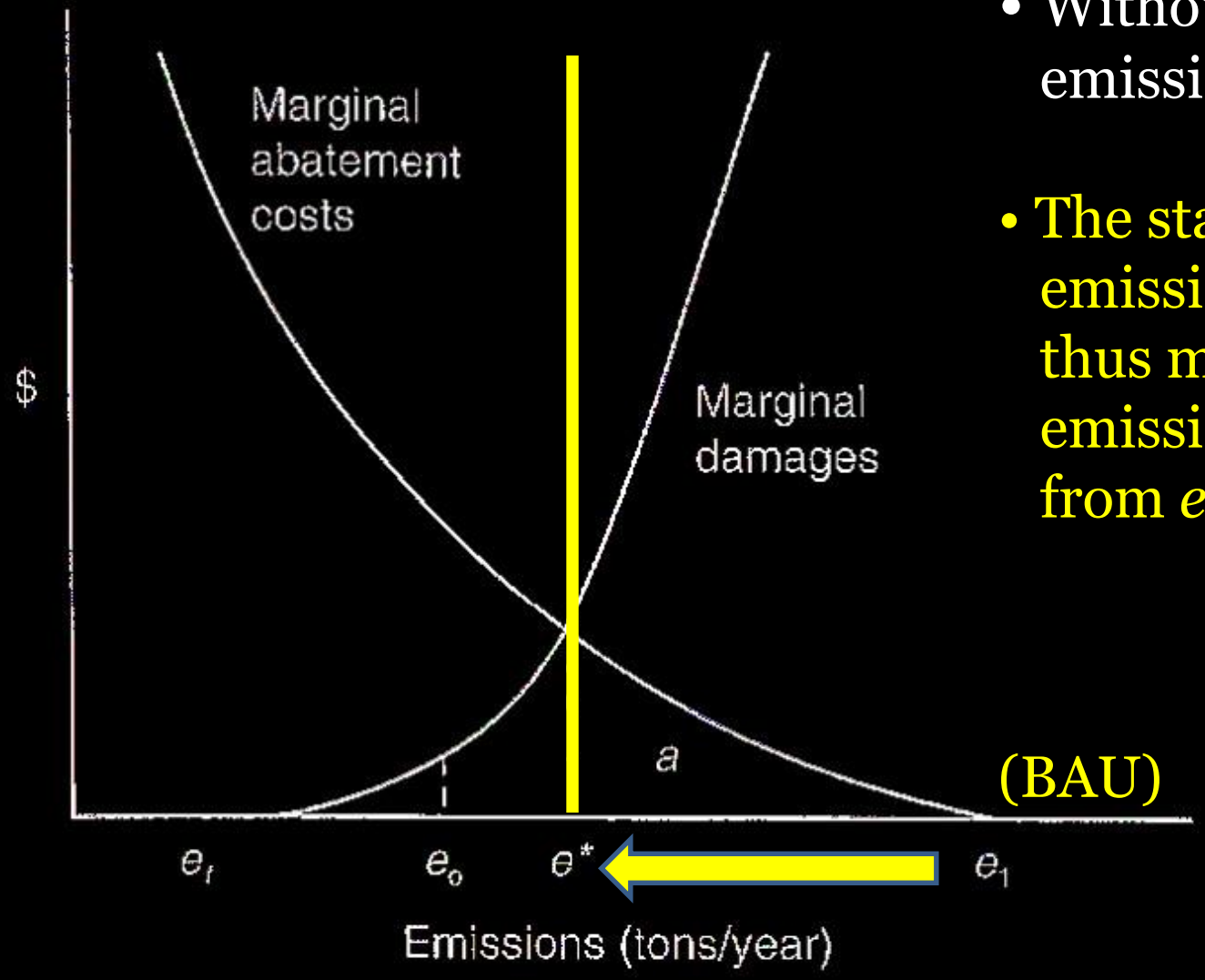


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- The standard permits emissions only up to $e^*$, thus mandating that emissions be reduced from $e_1$ to $e^*$

(BAU)

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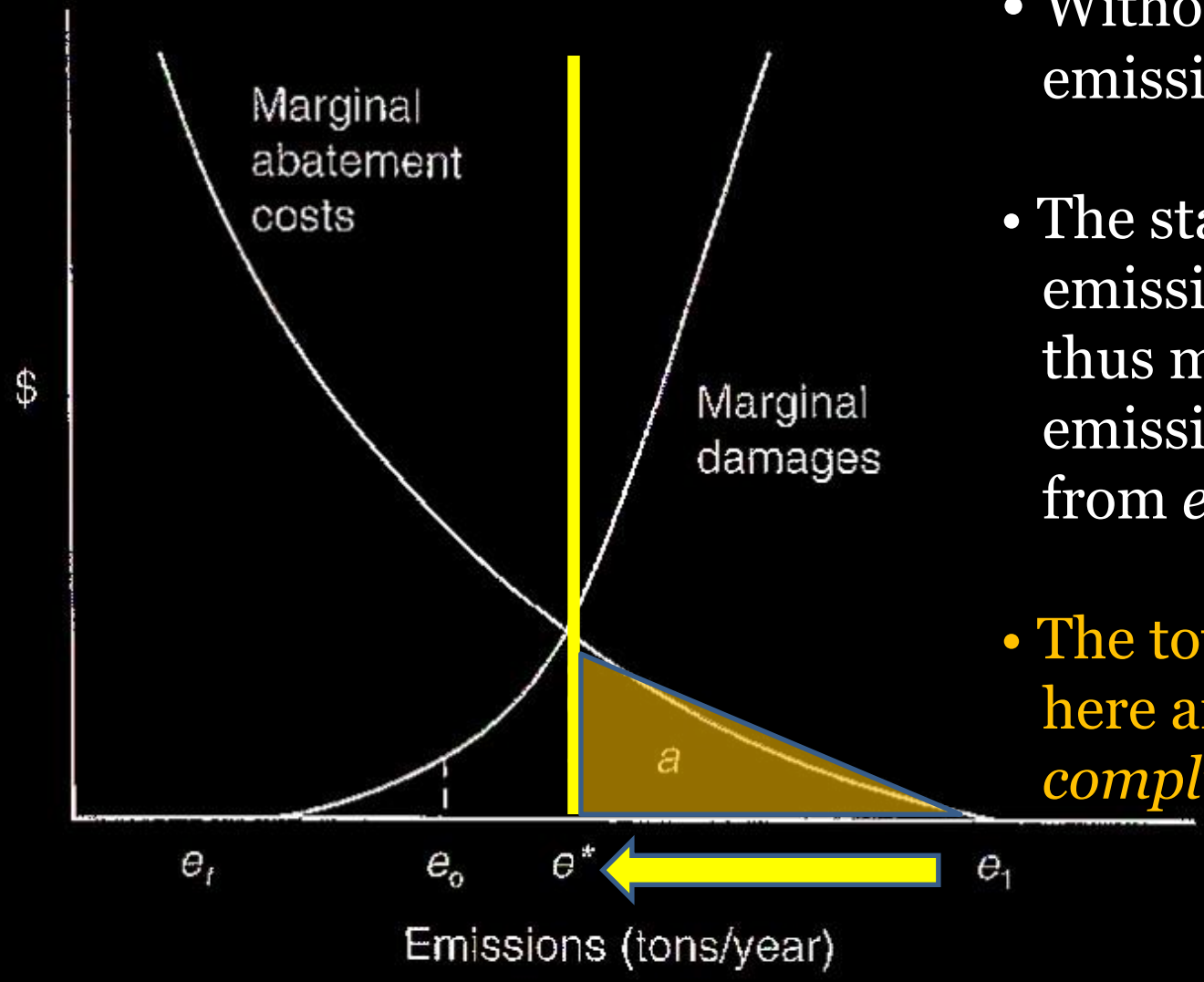
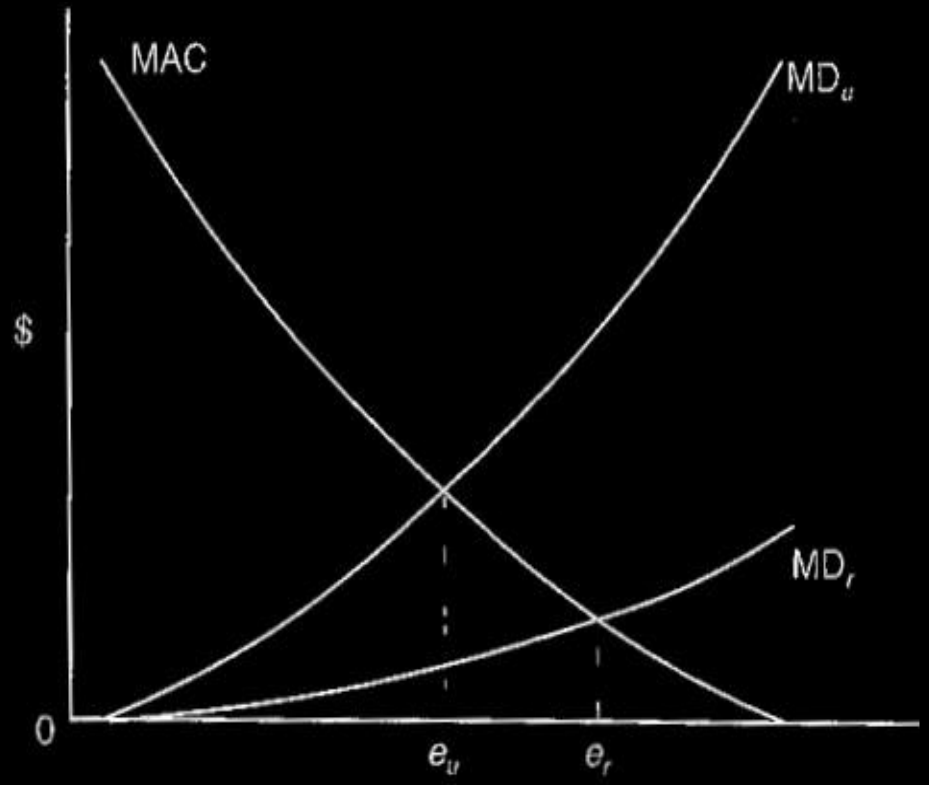


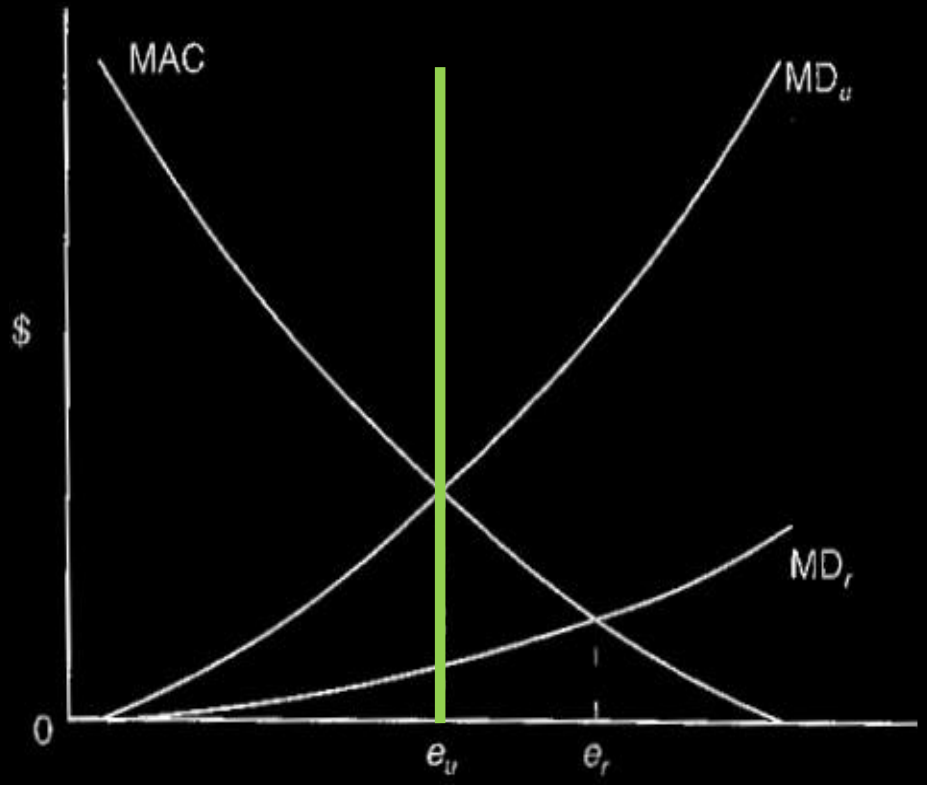

- Without the standard, emissions would be at $e_1$
- The standard permits emissions only up to $e^*$, thus mandating that emissions be reduced from $e_1$ to $e^*$
- The total abatement cost, here area *a*, is also the *compliance cost*

# 2. Benefits/drawbacks of standards




…with different MD curves!

# 2. Benefits/drawbacks of standards

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*What's optimal in the urban area ($MD_u$)*

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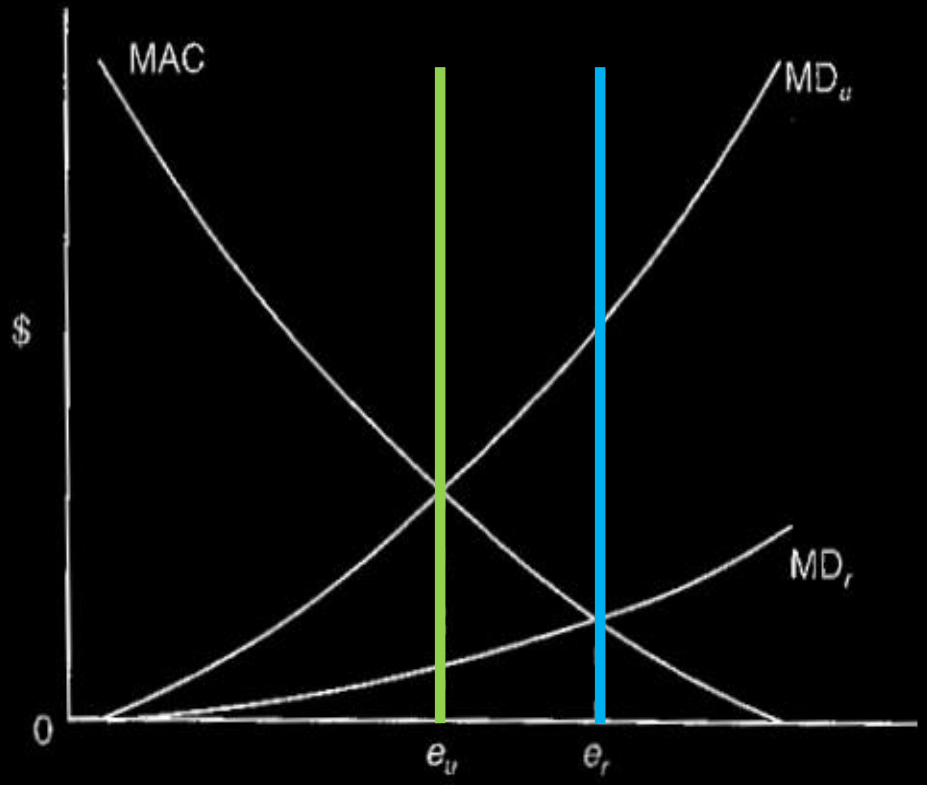


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*What's optimal in the urban area ($MD_u$)*
*is too restrictive in the rural area ($MD_r$)*

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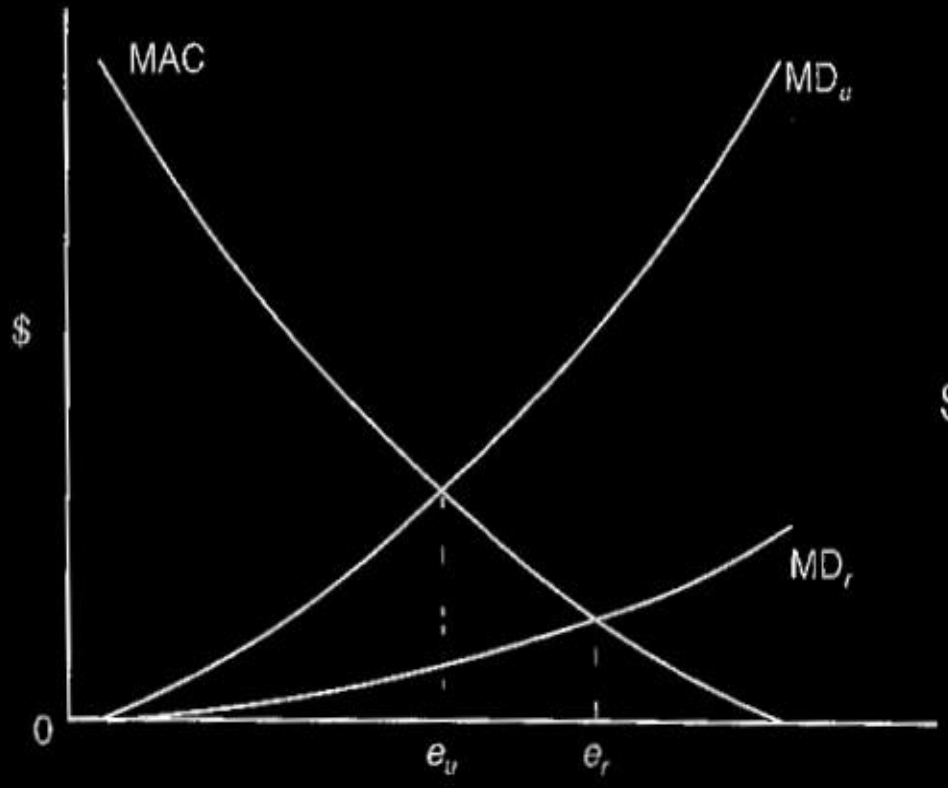


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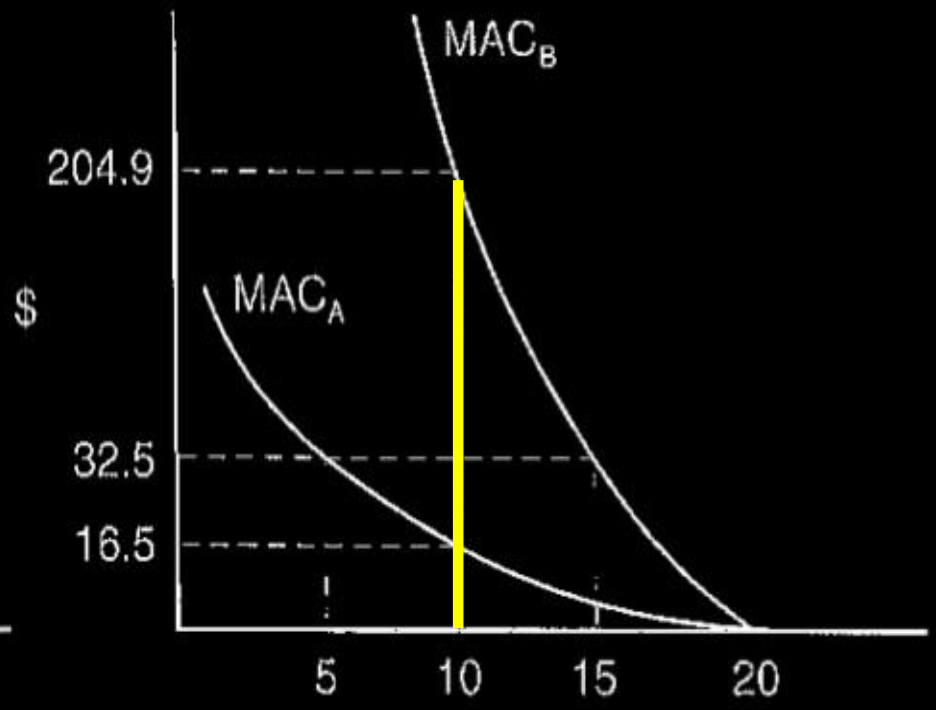


…with different MACs!

*What's optimal in the urban area ($MD_u$) is too restrictive in the rural area ($MD_r$)*

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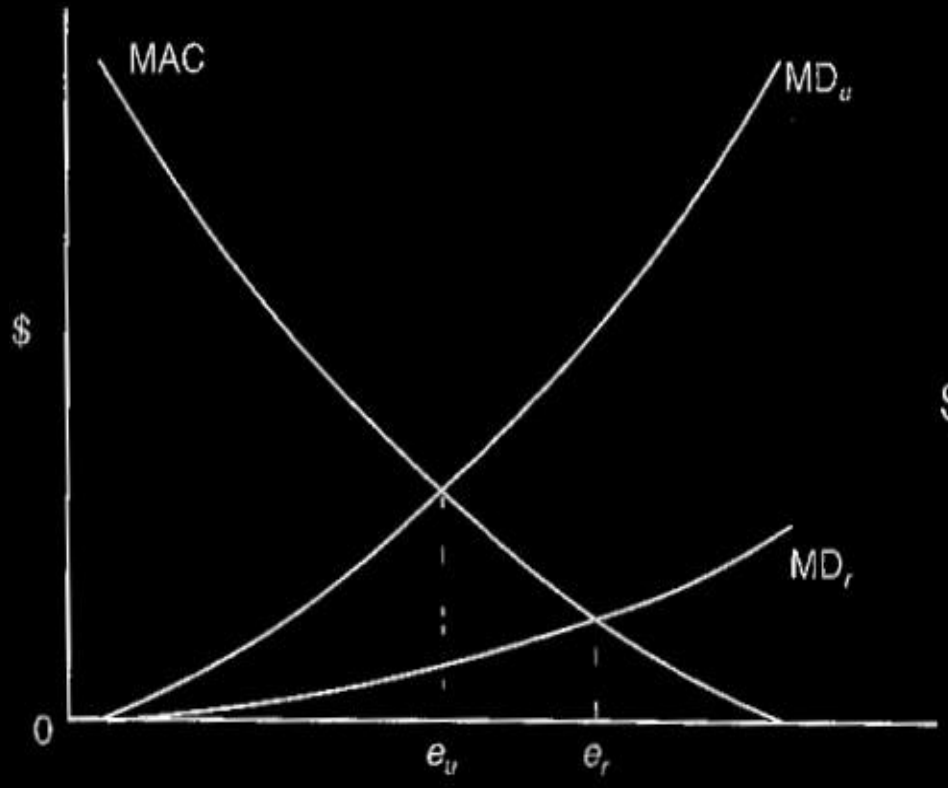


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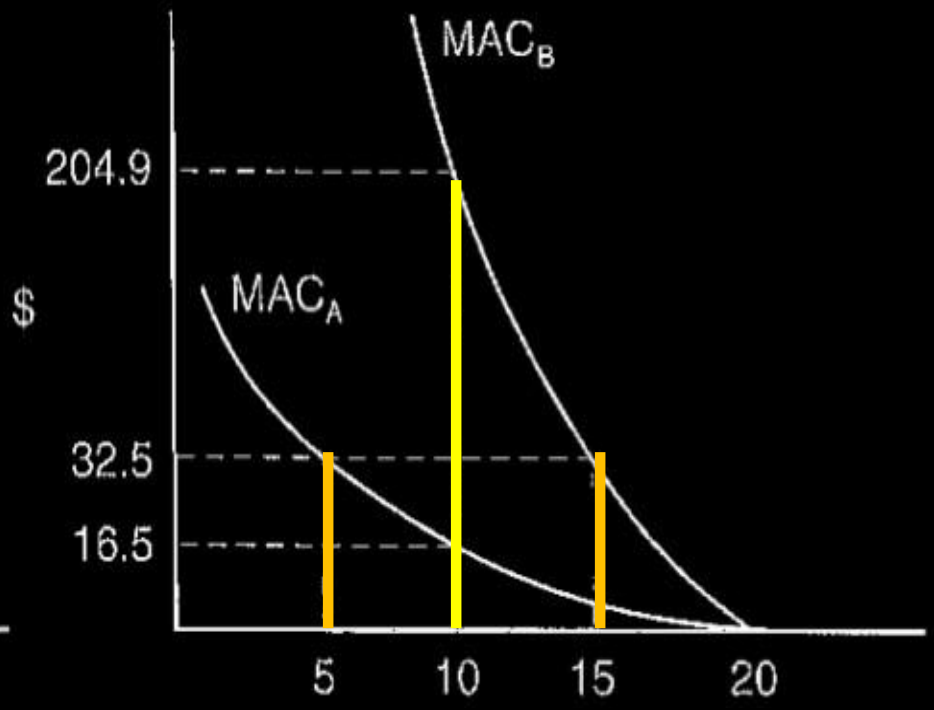


…with different MACs!

*Source A has a much lower MAC, and so should abate more than B*

# 2. Benefits/drawbacks of standards

- Uniformity of standards –
  a trade-off between costs and efficiency

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- Uniformity of standards –
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- Incentives for technological improvement –
  none under technology standards,
  some under the others (but still less
  than under a tax policy)

# 2. Benefits/drawbacks of standards

- Perverse incentives –
  when standards work *against* long-run improvements in abatement technology

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- Enforcement –
  standards allow flexibility in enforcement; the MPC (marginal penalty cost) function predicts compliance/non-compliance

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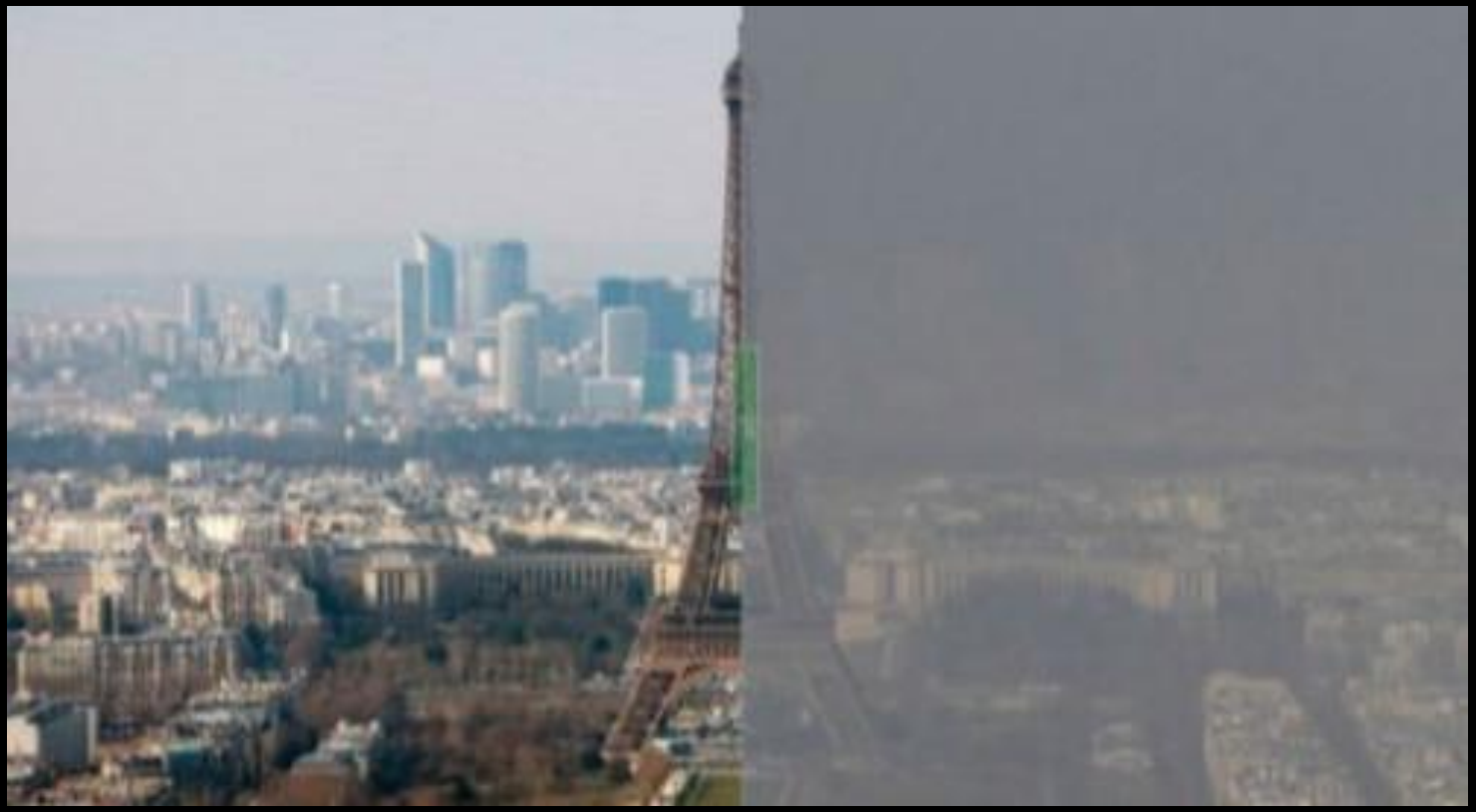
3. Three recent examples

# 3. Three recent examples

## Smog in Paris, March 2014



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# 3. Three recent examples

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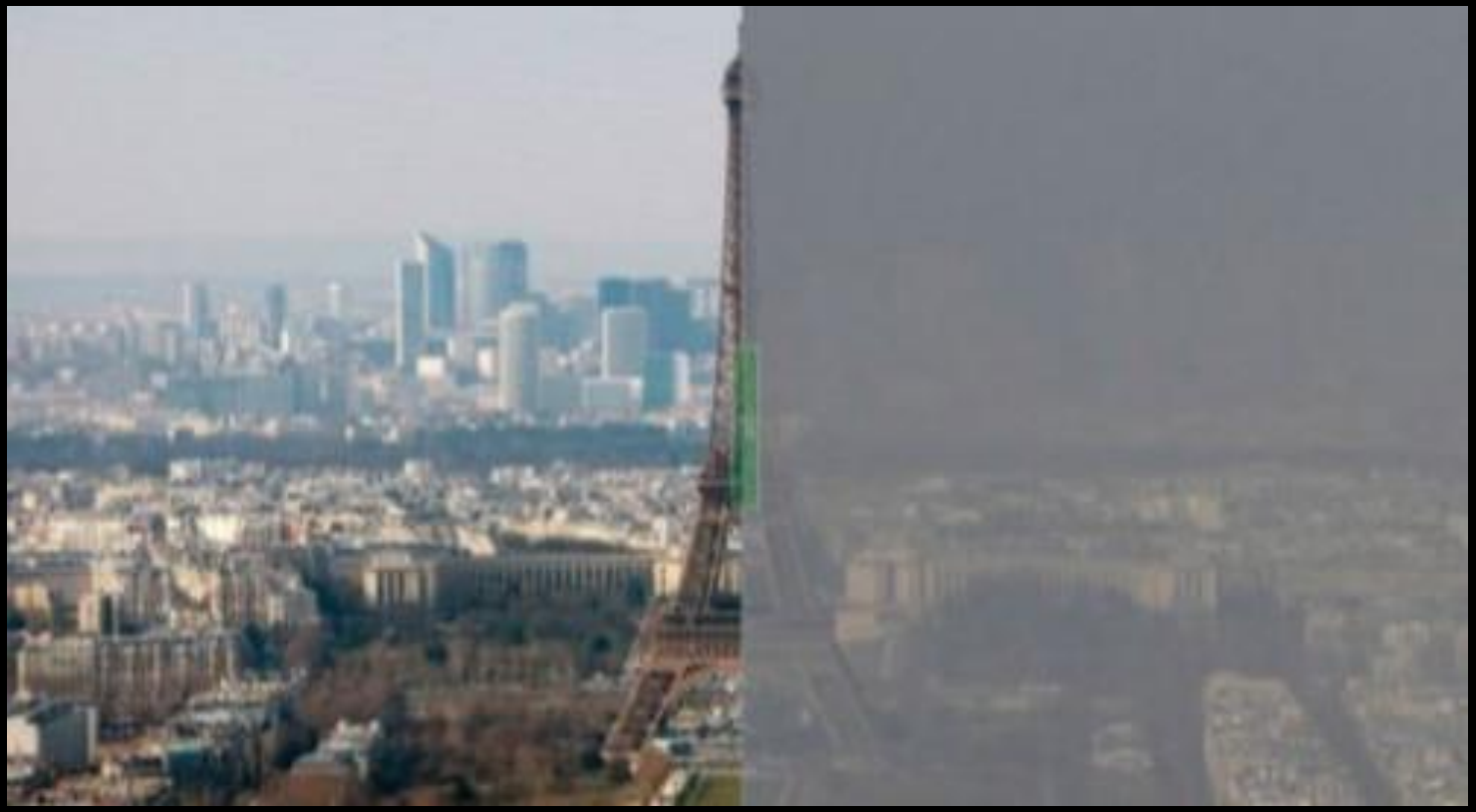

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Take note of the policy instruments mentioned!

# 3. Three recent examples

## Volkswagen emissions scandal

In September 2015, the EPA discovered that 482,000 VW diesel cars on US roads were emitting up to 40 times more toxic fumes (NOx) than permitted, thanks to a program in the engine software designed to sniff out test conditions and only then neutralize NOx.

VW subsequently admitted that the problem affects 11 million cars worldwide!

# 3. Three recent examples

## A happy story: Acid rain in Germany

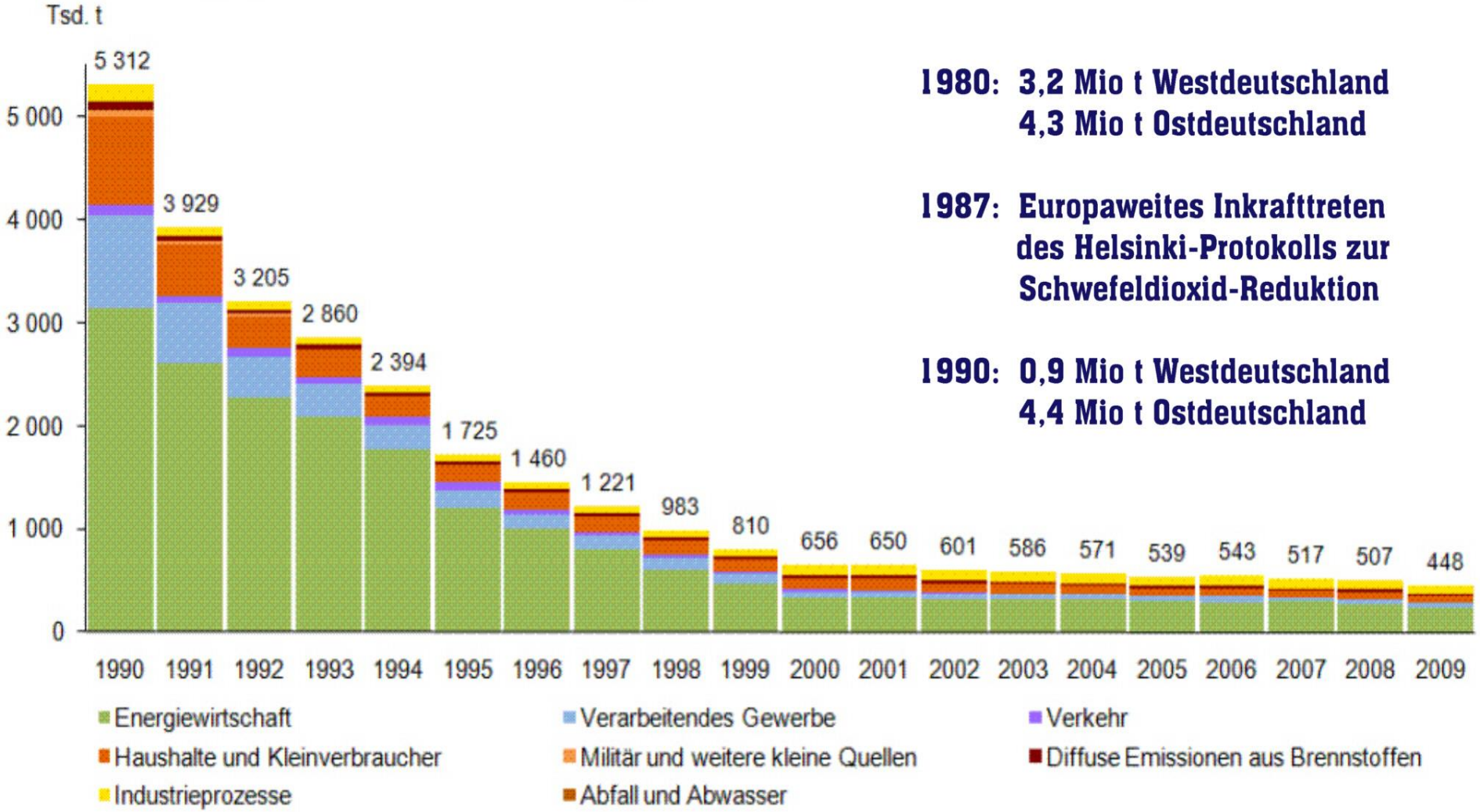

In the mid-1980s, West Germany

- imposed strict emission limits on sulfur dioxide,
- mandated low-sulfur fuel use in German fuel stations, an
- initiated a ten-year plan to outfit all German power plants with flue gas desulfurization scrubbers.

Here's the result:

# Deutschland 1980 - 2009

**Schwefeldioxid ($SO_2$)-Emissionen nach Quellkategorien**




**1980:** 3,2 Mio t Westdeutschland
4,3 Mio t Ostdeutschland

**1987:** Europaweites Inkrafttreten des Helsinki-Protokolls zur Schwefeldioxid-Reduktion

**1990:** 0,9 Mio t Westdeutschland
4,4 Mio t Ostdeutschland

**Verkehr:** ohne land- und forstwirtschaftlichen Verkehr
**Haushalte und Kleinverbraucher:** mit Militär und weiteren kleinen Quellen (unter anderem land- und forstwirtschaftlicher Verkehr)

**Quelle:** Umweltbundesamt, Nationale Trendtabellen für die deutsche Berichterstattung atmosphärischer Emissionen seit 1990 (Stand: 15. April 2011) http://www.umweltbundesamt.de/emissionen/publikationen.htm

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