

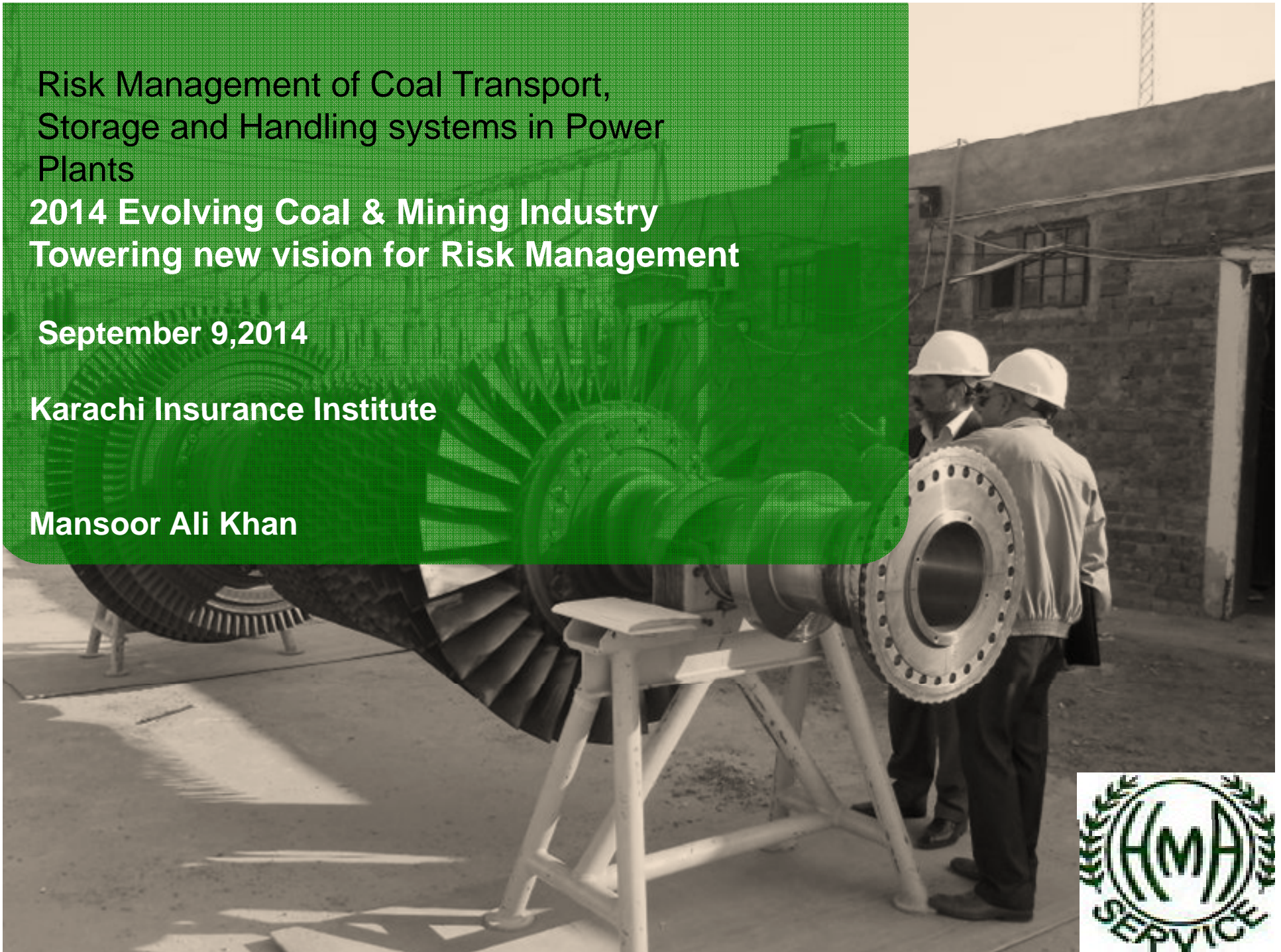
Risk Management of Coal Transport,
Storage and Handling systems in Power
Plants

**2014 Evolving Coal & Mining Industry
Towering new vision for Risk Management**

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Karachi Insurance Institute

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OUTLINE



COAL AS A FUEL – PAKISTAN’S PERSPECTIVE

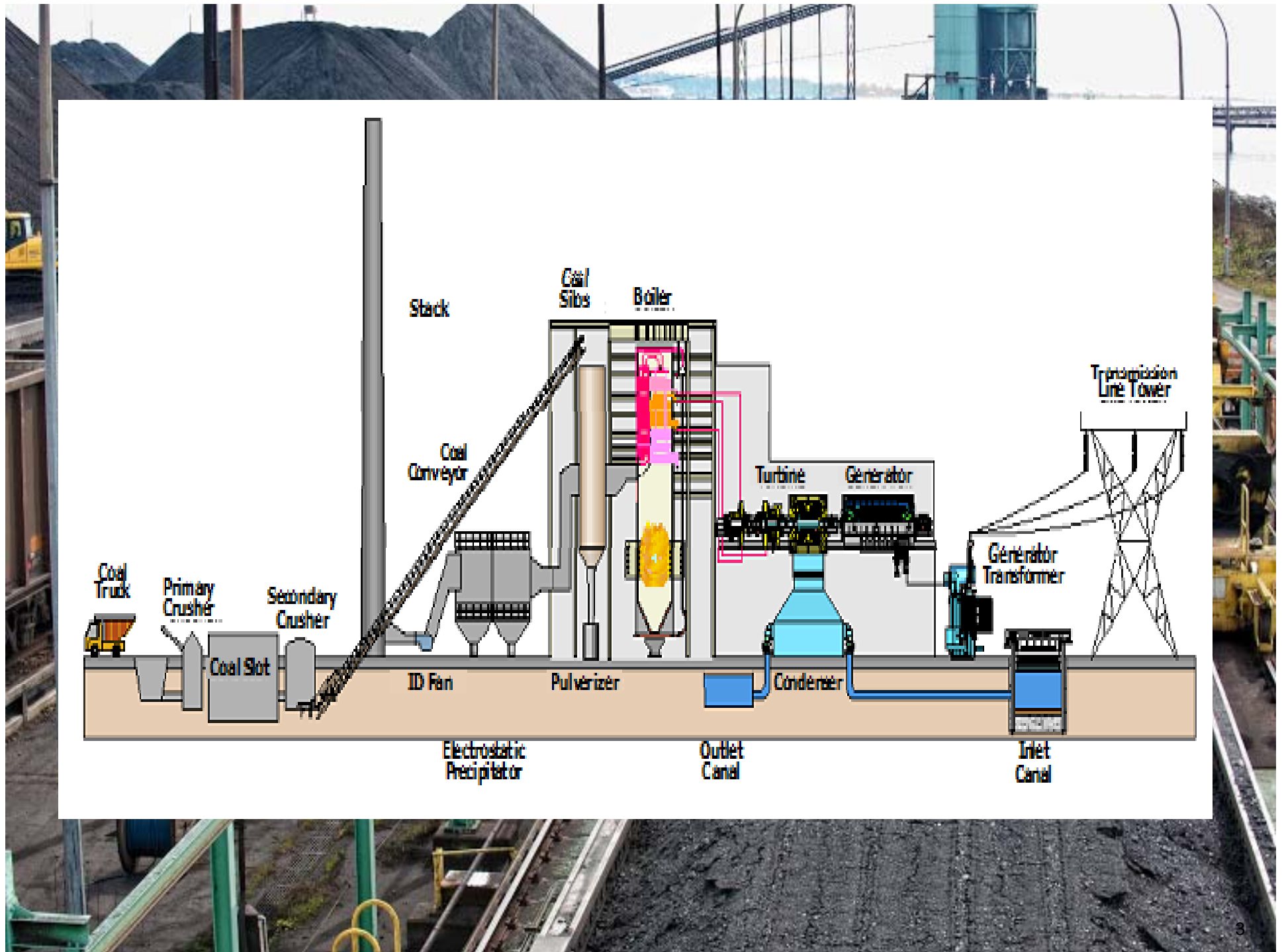
COAL POWER PLANT INITIATIVES

TRANSPORTATION, HANDLING, STORAGE & CONVEYANCE

HAZARDS AND RISKS

DETECTION, PROTECTION and PREVENTION MEASURES

POWER PLANT COAL RELATED ACCIDENTS



Coal Power Initiatives – Pakistan in 2014

Gadani Power Park – 10,000 Mw

Punjab – 6 x 660 Mw Power Plants

Bin Qasim – 2 x 660 Mw

Thar Coal – Minemouth plants 660 & 1000 Mw



Coal - Pakistan

Traditionally used in Brick kiln,ovens.

185 billion tons estimated reserves

Potential for 100,000 Mw

Annual consumption – 6 million tons

154 Mw Lakhra Power plant

1990s Thar Coal Development – Gordon Wu

OMC Lobby

Federal / Provincial issues

Cement Industry – Due to Gas shortages

Coal Consumption Examples




50 Mw plant – 1000 Mtpd – 300,000 Mtpy

500 Mw plant – 4000 Mtpd – 1,200,000 Mtpy

2880 Mw plant – 18,500 Mtpd – 5,500,000 Mtpy

Transportation & Misc.issues

The background image shows a long, elevated conveyor belt system used for transporting coal. The belt is filled with dark coal and stretches into the distance. To the left, there are large piles of coal and some industrial structures. To the right, there's a body of water and some greenery. The sky is overcast.

2 Seaports for Imported coal

Overcrowded highways – Load limitations

Inefficient Rail road system

Inadequate Rolling Stock

Located close to Urban population

Environmental & Health degradation

Lack of technical and supply chain expertise



AERIAL OF 2880 Mw COAL FIRED PLANT

A background image showing a dark industrial scene with a large smokestack emitting thick black smoke into a cloudy sky. A silhouette of a worker is visible on the right side of the frame.

Hazards & Risks

Fast spreading fires – Spontaneous heating

Slow Isolated Fires

Explosions

Uncontrolled release of toxic corrosive / flammable liquid

Bursting of pipeline / vessels

Breach of dams / ash dykes

Flooding

Coal dust in mills and Boilers

The Nation

Hazards & Risks

Coal dust deposited on Cables and cable trays

Fuel oil handling and oil tanks (HSD, HFO, Petrol)

Electrical system

Heat path damaged insulation

Dry grass and overgrowth

Process Areas

Coal Handling Plant

Main plant including Boiler, TG, ESP

Water treatment plant use of Chlorine gas

Hydrogen generation plant

Fuel Oil handling areas

Release of Gases / Dust

Chlorine in water treatment plant

Hydrogen in turbo generated area of main plant

Pulverized coal dust from mills and associated piping

Fly ash from chimneys and ash ponds , ESP hoppers and bottom ash system

Coal dust in transfer points, CHP, Crusher and mill area

Flue gas from the ducts

Explosion Hazards in Coal Plants

The background image shows a long, elevated conveyor belt system for transporting coal. The conveyor is made of metal and runs parallel to a dirt road. On the right side of the conveyor, there are yellow mechanical components, possibly part of a loading or unloading system. The coal is piled up on the conveyor, and the overall scene is industrial and somewhat overcast.

Hydrogen plant

Turbo generators where hydrogen is used for cooling of TG

Transformer (Oil Cooled)

Boiler (Coal/Oil Fired)

Coal dust in Mills and Boilers

Detection Sytems

A photograph of a large industrial facility, likely a power plant or coal processing plant. A long, elevated conveyor belt system is the central focus, carrying a dark, granular material (likely coal or ash) from the foreground towards the background. The conveyor is supported by a series of green metal structures. To the right of the conveyor, there are yellow industrial vehicles or components. In the background, there are large piles of material, a tall blue structure, and a body of water under a clear sky.

Many plants employ outdated system – Heat bulb Sprinklers

Integrated CO monitoring system can now give 48 hours advance information about a fire linked to PLC & SCADA systems

Thermal imaging & IR scanners

CO and fire is now preferable to smoke detection

Location of sensors is of importance

Protection System

The background image shows a long, elevated conveyor belt system for transporting coal. The conveyor is made of multiple sections, with the coal pile visible on top. To the right, there's a yellow piece of machinery, possibly a stacker or reclaimer, with a large spool of cable. In the distance, a body of water and some industrial structures are visible under a clear sky. The overall scene is an industrial coal handling facility.

Dust control – Electrostatic precipitators – Glass bag filters

Fire Control – Sprinkler system – FM 200

Emission control – Ventilator fans

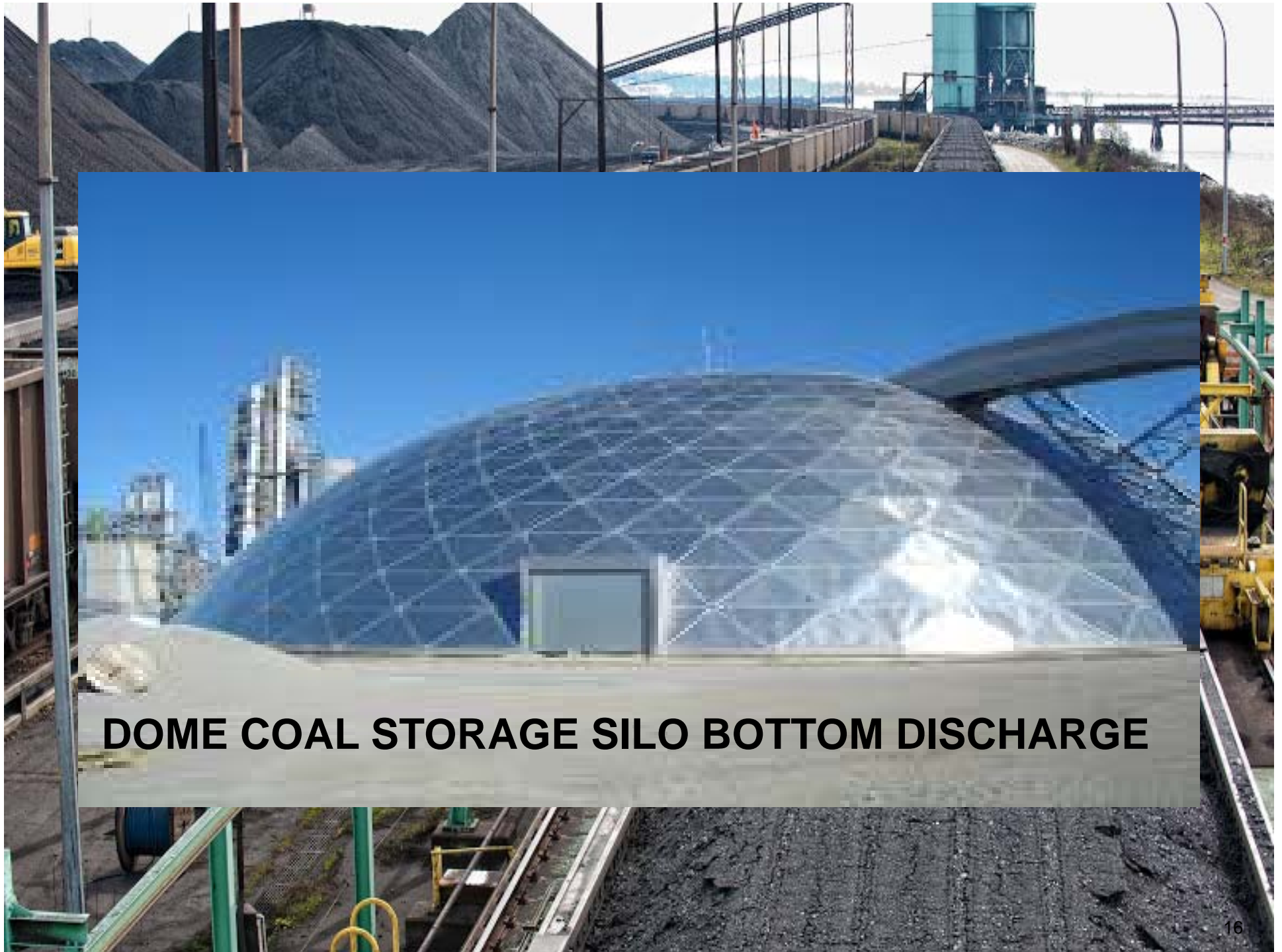
Spill control – Conveyor shrouds

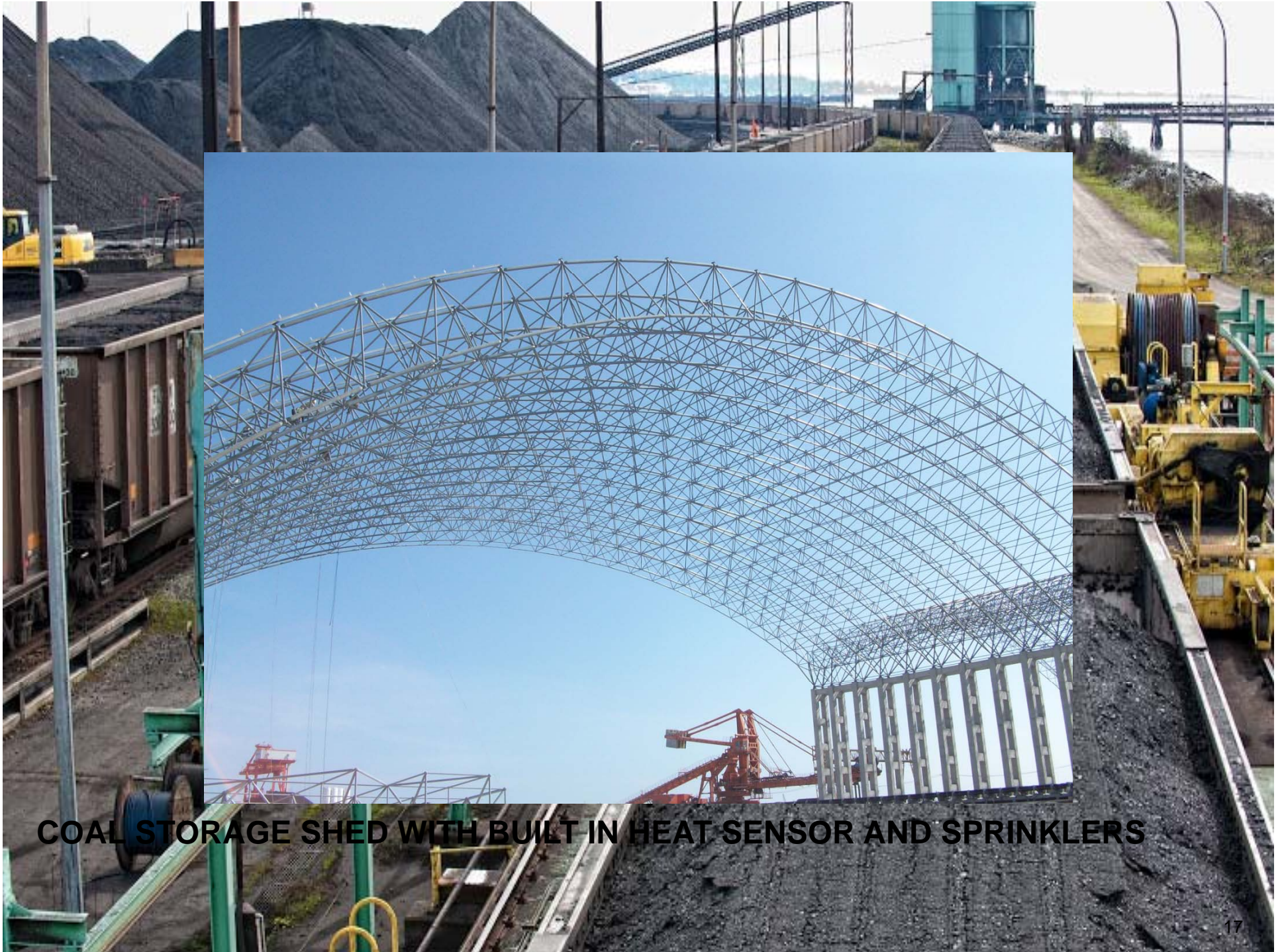
Traffic management – Earth moving equipment
Stacker / Reclaimers – Conveyor belts – Driver/
Operator training

Coal crushers and Grinding plants – Water sprays

Fire retardant low smoke cables

Personal safety – PPEs





COAL STORAGE SHED WITH BUILT IN HEAT SENSOR AND SPRINKLERS

Emergency equipment & Facility



Fire fighting equipments

Emergency medical suppliers

Toxic gas detectors

Wind direction (wind sock) / Speed indicators

Self contained breathing apparatus

Protective clothing

Containment facilities around tank / vessels
Interfaces and lines of communication with off
site officials, neighboring industries

Case Study – Power Plant

2740 Mw Coal fired power plant in US

105 employees

Coal consumption 6.1 Million tons

Caused by: fine particle pollution consisting of a complex mixture of soot, heavy metals, sulfur dioxide and nitrogen oxides

Health costs

Death – 69 – \$500,000,000

Heart attacks – 110 – \$12,000,000

Chronic Bronchitis – 40 – \$18,000,000

Hospital admissions – 52 – \$1,200,000

Case Study – Coal plant fire accident

2880 Mw Eraring coal fired power plant, Lake Macquaire

Coal usage 5.5 million tons annually

Three modes of coal transport

Railroad – 100 km plus distance

Road trucks – 50 km

Conveyor Belts – 6–10 Km

Plant was shutdown after fire accident

World record holder – 728 days full load operation without a trip

8800-8800 8th Coal Stacker
Reclaimer for Westshore Ter-
minals Ltd, Canada

Radius: 200 ft (60.96 m)
Span: 36 ft (10.97 m)
Speed: 5 ft/min
Conveyor: 600 ft/min
Discharging: 30 ft/min
Hoisting: 0-110 rpm
Travelling: 100 ft/min



COAL CONVEYOR STACKER





WHEEL LOADER MOUNTED COAL DUST DISPOSAL CHUTE



**COAL FEEDING CONVEYOR TO
COAL MILLS**





PLANT WAS SHUT DOWN AND SOLD ON ENVIRONMENTAL RISK GOUNDS

Thank you! Questions?

