Outcomes of Technology Tools used in Environmental Law Enforcement

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SEP 22, 2015

Outline


Technological Inspection Tools


Case example in Taiwan


Conclusions

Outline

Technological Inspection Tools

Summary of Technological Inspection Tools

Analysis Instruments

- X-ray fluorescence spectrometry (XRF)
- Fourier transform infrared spectroscopy (FTIR)
- Raman spectrometer
- Portable COD meter
- DO/pH/ORP/Con. meter
- Flame ionization detector (FID)
- Photoionization detector (PID)
- Air detector tube

Spot Searching

- Google Maps
- Formosat-2 satellite image
- Unmanned aerial vehicle (UAV)
- Light Detection and Ranging (LiDAR)
- 3D LiDAR
- Forward looking infrared (FLIR)

Monitoring and Checking

- Ground-penetrating radar technique
- Pipe endoscope
- Monitoring system
- Flexible tube camera
- Time Lapse
- Continuous Wastewater Monitoring Systems (CWMS)
- Continuous Emission Monitoring System(CEMS)

Application of Technological Inspection Tools

Waste Inspection

Search Pollution and observe target

Build Terrain and estimate volume of waste

Application of Technological Inspection Tools

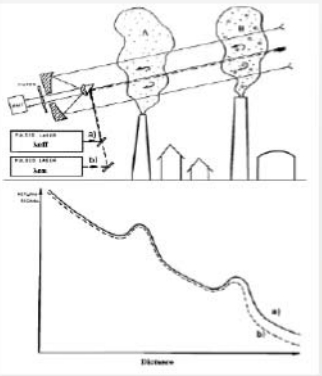
Wastewater Inspection

Check the pipe inside

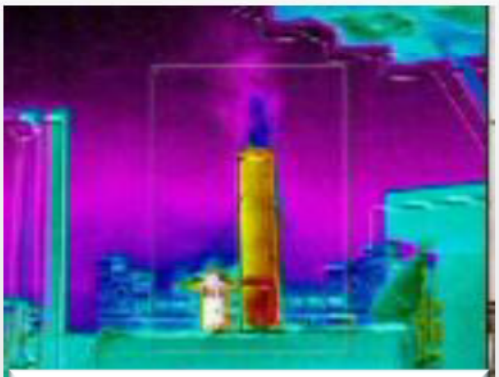
Detect underground pipelines

Application of Technological Inspection Tools

Air Pollution Investigation



- Pinpoint sources of pollution
- Immediate grasp of pollution
- Image display, glance around pollution situations

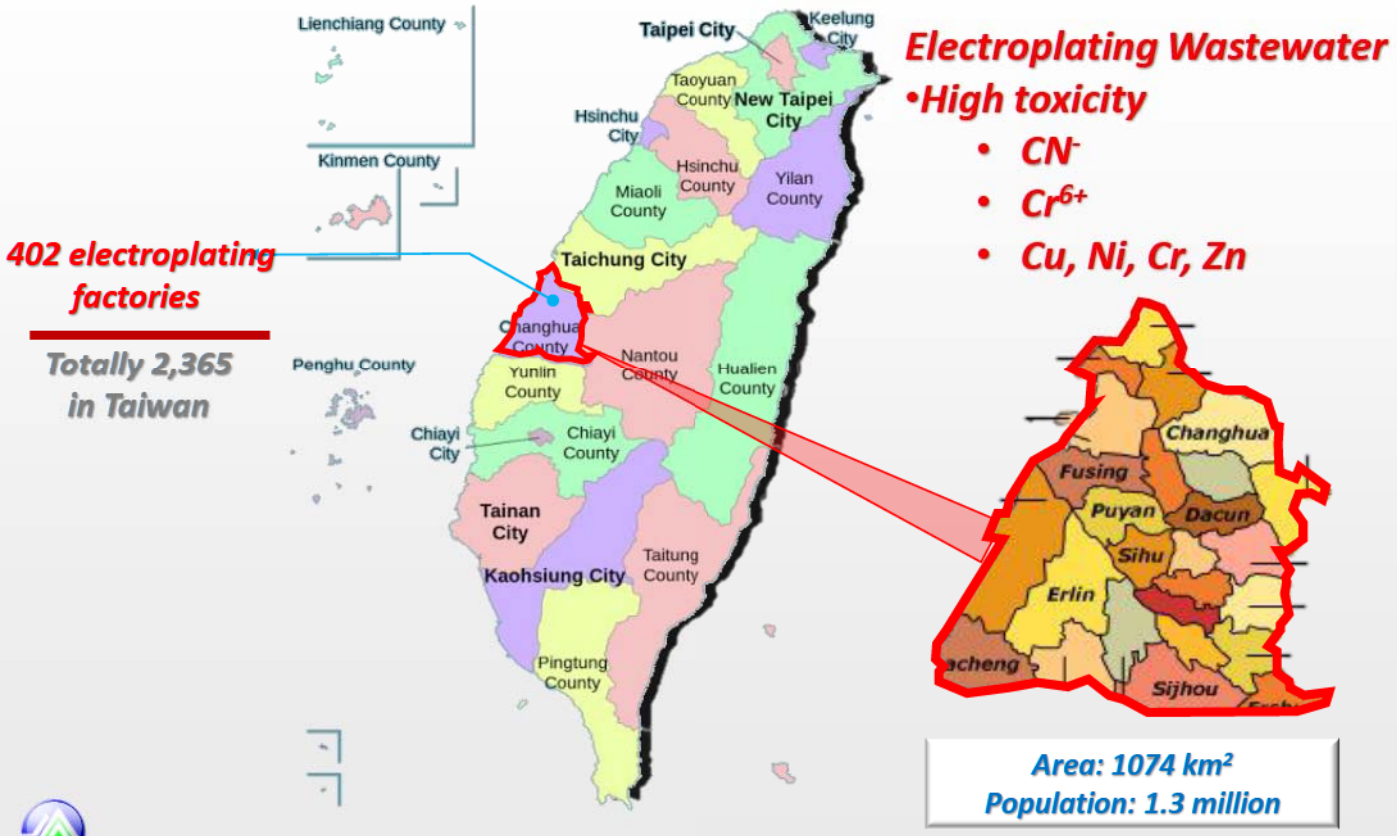


- Easy to find the illegal flue

Outline

Case example in Taiwan :
Illegal discharge of untreated wastewater from electroplating factories in
Changhua county, Taiwan

Distribution of electroplating factories



402 electroplating factories

Totally 2,365 in Taiwan

Electroplating Wastewater

- **High toxicity**
  - CN^-
  - Cr^{6+}
  - Cu, Ni, Cr, Zn

Area: 1074 km²
Population: 1.3 million

The case we found

Farmland

Sampling points of farmland

Some samples contained heavy metals (Cu, Zn and Cr) exceeding the standard amount for soil

Paper work

Process

- Paper work
- Source confirmation
- Overall review
- Monitoring
- Action
- Achievements

Information Tools

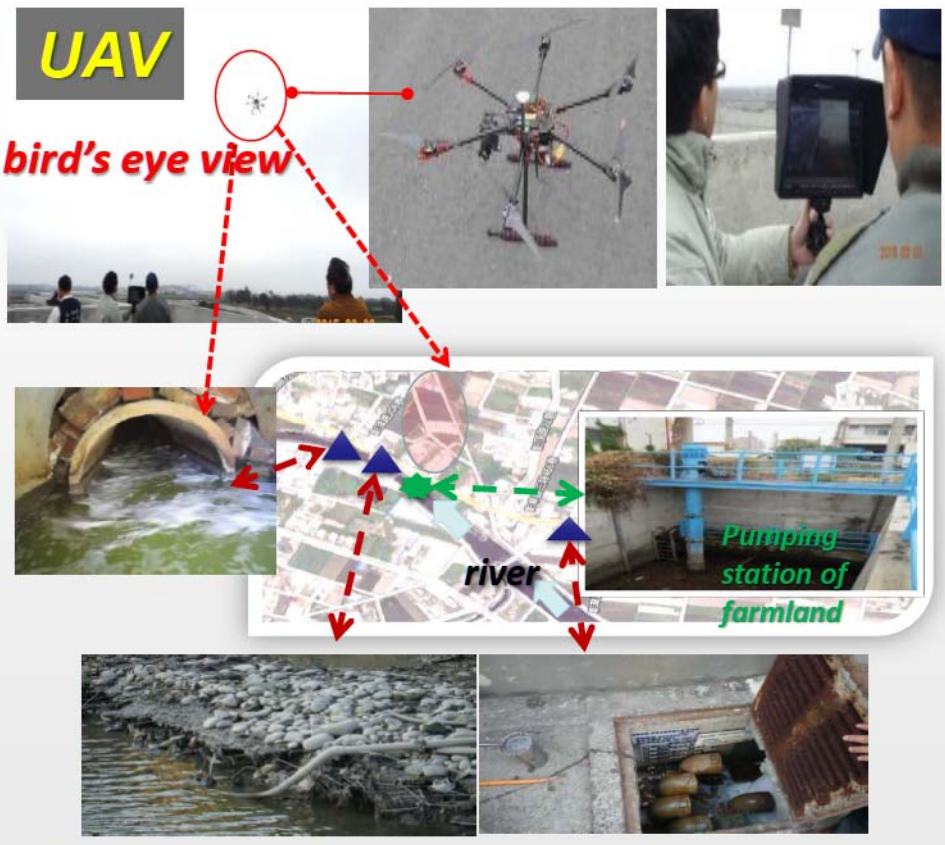
- Managing system for water pollution
- Stationary source air pollution management system
- Industrial waste report and management system
- Declaration system
- Irrigation water system
- Hydrology system

- Who?
- Where?
- How?

Source confirmation

Process

- Paper work
- Source confirmation
- Overall review
- Monitoring
- Action
- Achievements



Overall review

relations diagram

Process

- Paper work
- Source confirmation
- **Overall review**
- Monitoring
- Action
- Achievements

Monitoring

Monitoring and Taking Evidence

Process

- Paper work
- Source confirmation
- Overall review
- **Monitoring**
- Action
- Achievements

Outfall

Monitor-ing tool

Taking evidence

Group meeting before action

Process

- Paper work
- Source confirmation
- Overall review
- Monitoring
- **Action**
- Achievements

Action

Process

- Paper work
- Source confirmation
- Overall review
- Monitoring
- **Action**
- Achievements

■ **Ground penetrating radar**
to check the position of underground pipe

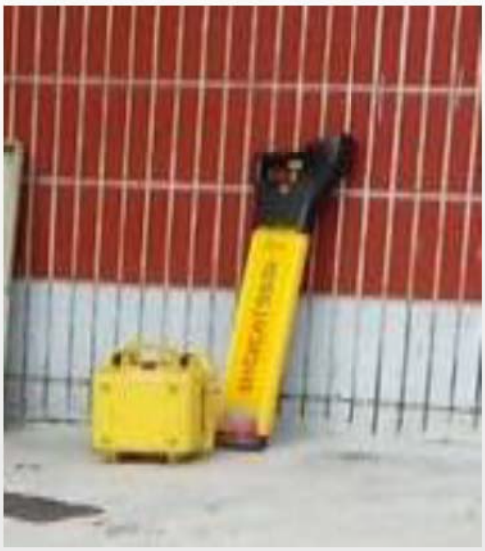
Action

Process

- Paper work
- Source confirmation
- Overall review
- Monitoring
- **Action**
- Achievements

■ **Pipe locator**

to check the run of pipe



Action

Process

- Paper work
- Source confirmation
- Overall review
- Monitoring
- **Action**
- Achievements

■ **Mini camera**

to check the narrow/dangerous space

Action

Process

- Paper work
- Source confirmation
- Overall review
- Monitoring
- **Action**
- Achievements

■ **Pipe endoscope**

to check the divided manifold of pipe

Action

Process

- Paper work
- Source confirmation
- Overall review
- Monitoring
- **Action**
- Achievements

Accomplishments

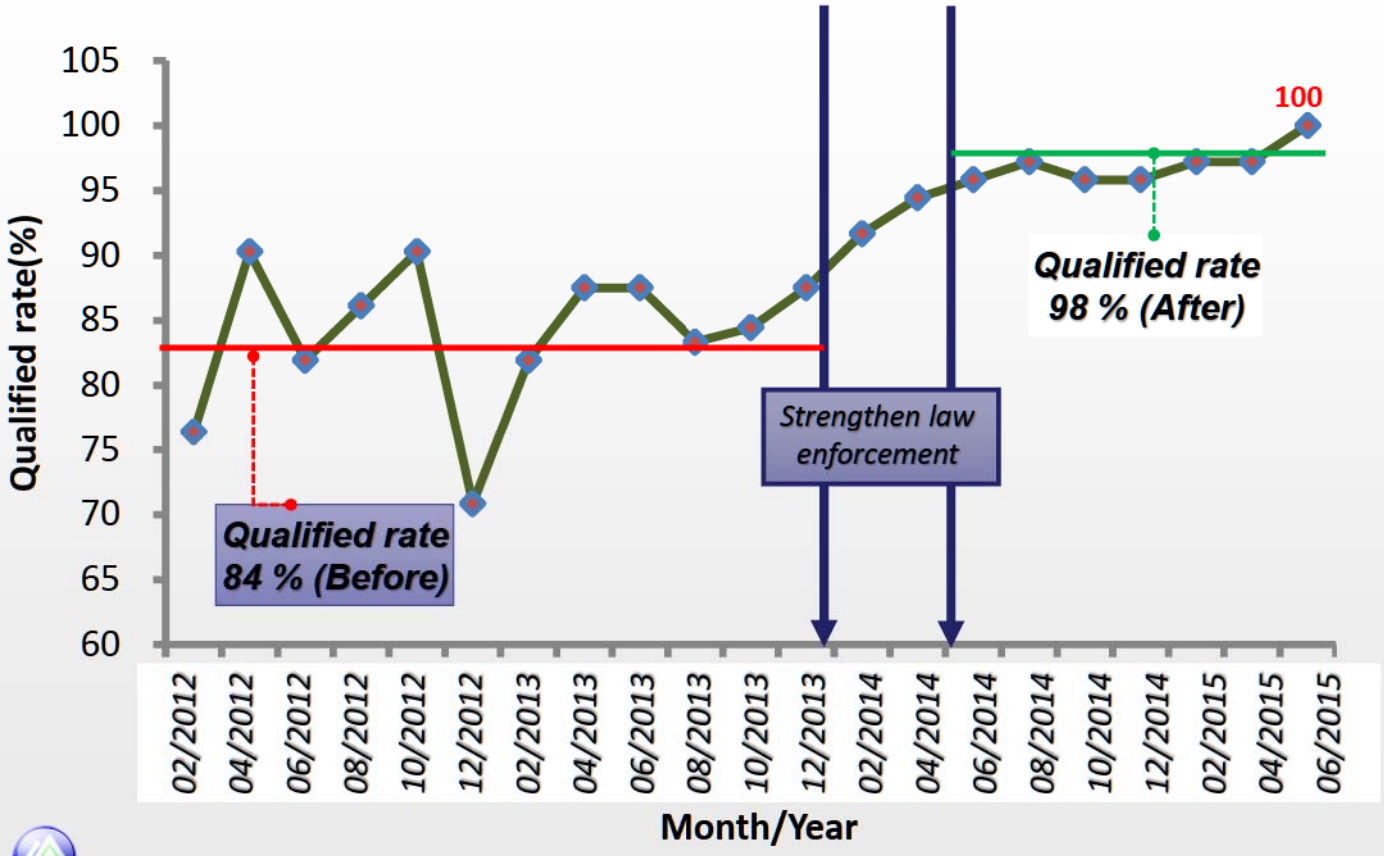
Process

- Paper work
- Source confirmation
- Overall review
- Monitoring
- Action
- **Achievements**

The offenders touched on

- *Environment law*
- *Shutdown*
- *Criminal code*

Improving irrigation water quality



Improving river water quality

The fish swimming in the water

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Press release

- Showing Technology Tools
- Frighten and hinder illegal
- Enhance the public trust

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Outline

Conclusions

Conclusions

- **Benefits of Technological Inspection Tools**
  - Provide scientific evidence
  - Save manpower
  - Avoid alerting the offender
  - Enable evidence collection from hard-to-reach areas
  - Protect the inspectors' safety
- **Future Development**
  - Low cost sensors
  - Real-time network data transmission
  - Longer power for the monitoring equipment

~ Thank you for your attention ~

Road map for achieving full compliance with Best Available Technology (BAT) and Best Practicable Environmental Options (BPEO) based on Polluter Pays Principle (PPP)

K.H. Muthukuda Arachchi
Director General
Central Environmental Authority

Content

- EPL Process – Procedure & Objectives
- EPL Compliance in a nutshell
- Adoption of Best Available Technologies (BAT) & Best Environment Practicable Options (BEPO)
- Compliance Assistance Programmes
- Proposed Regulations & Standards
- Road Map for wastewater Discharge Fee Scheme
- Way Forward

EPL Process – Procedure & Objectives

National Environmental Act No 47 of 1980 and its amendments addresses ;

the Environmental Protection & Management

Part IV - Environmental Management
Part IVA - Environmental Protection
Part IVB - Environmental Quality
Part IV C - Approval of Projects

- Part IV A Section 23A, B, C, D, E of NEA provide for Environmental Protection.
- This enable the legal frame work for issuance of a licence known as Environmental Protection Licence (EPL)
- Became operative from 1st July 1990.

(Environmental Protection Licence)EPL

Objectives :

- To prevent or minimize the discharges and emissions into the environment
  - From the prescribed activities in the gazette notification No.1533/16 dated 25.01.2008
  - In compliance with the National Discharge and Emission standards
- To develop an approach in Pollution Control through
  - The best practicable Environmental Options (BPEO)
  - Best Available Techniques (BAT)

EPL Contd…

- The EPL issued to a prescribed activity will stipulate the standards and criteria under which such an activity is allowed to discharge their wastes
- The EPL issued to a prescribed activity is legally bounded on such activities
- The violation of the conditions in the EPL is an offence punishable under the provisions of the Act. (NEA)

EPL Contd…

- The holder of an EPL is under the obligation to comply with any directive given by the CEA to prevent or mitigate the environmental pollution and hazards
- The EPL shall ensure that monitoring of environmental pollution

or

- Other acts the CEA considers necessary to protect the environment

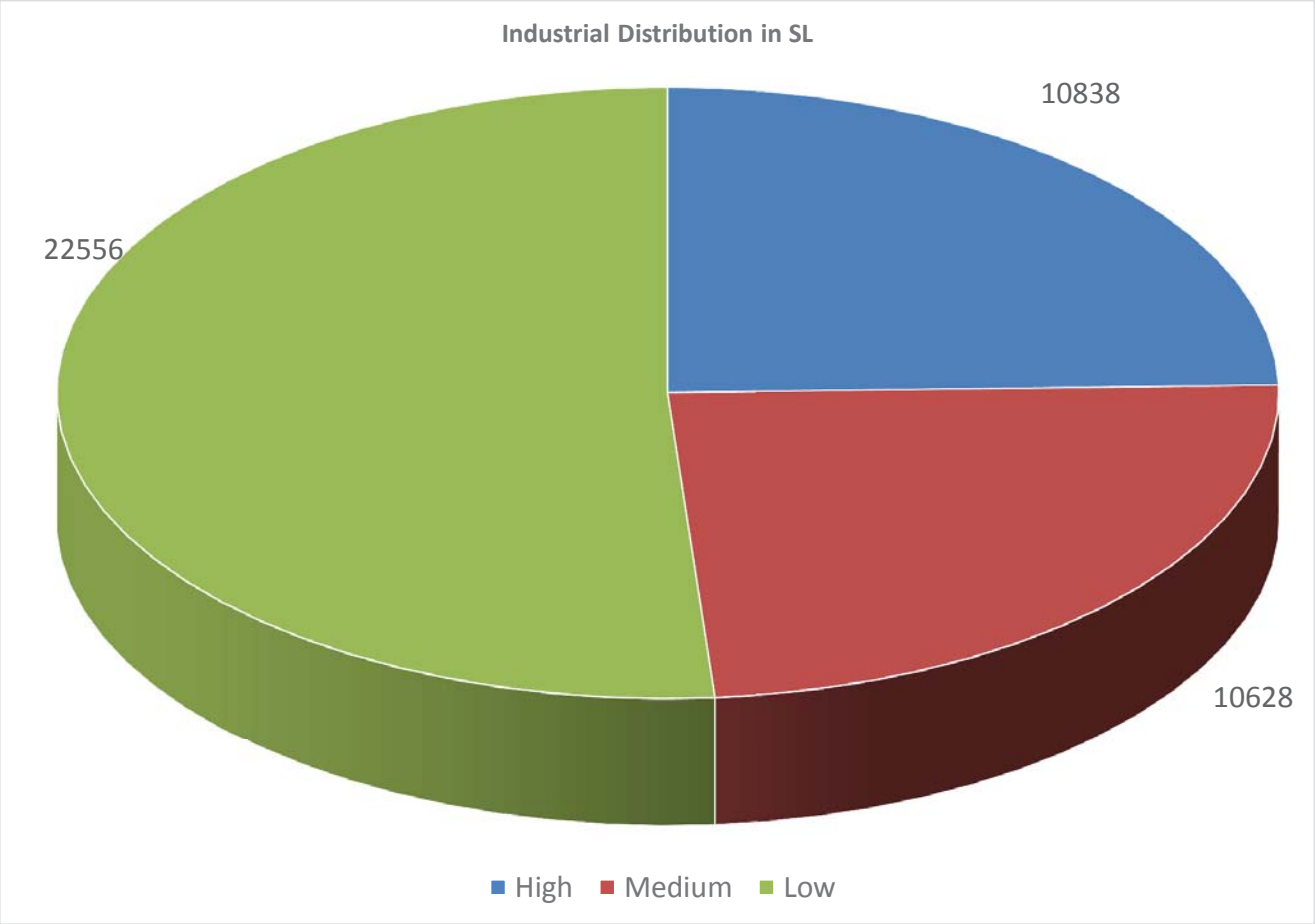
Environmental Pollution Control Strategies

Major Tools	Standards
Environmental Protection Licence Procedure	Wastewater Discharge Standards
Environmental Impact Assessment procedure	Ambient Air Quality Regulations
Site Recommendation Procedure	Source Emission (Air) Standards
Scheduled Waste Management Licence	Vehicle Emission Regulation
Environmental Standards and Guidelines	Noise Control Regulations
Fines and Penalties	Guidelines on Ground Vibration and Air Blast over pressure
Cabinet memorandum- guidelines for for siting of industries in the vicinity of Kelani River	Solid Waste Management Policy and Strategies
	Hazardous waste Management Regulations
	Implementing BRS conventions

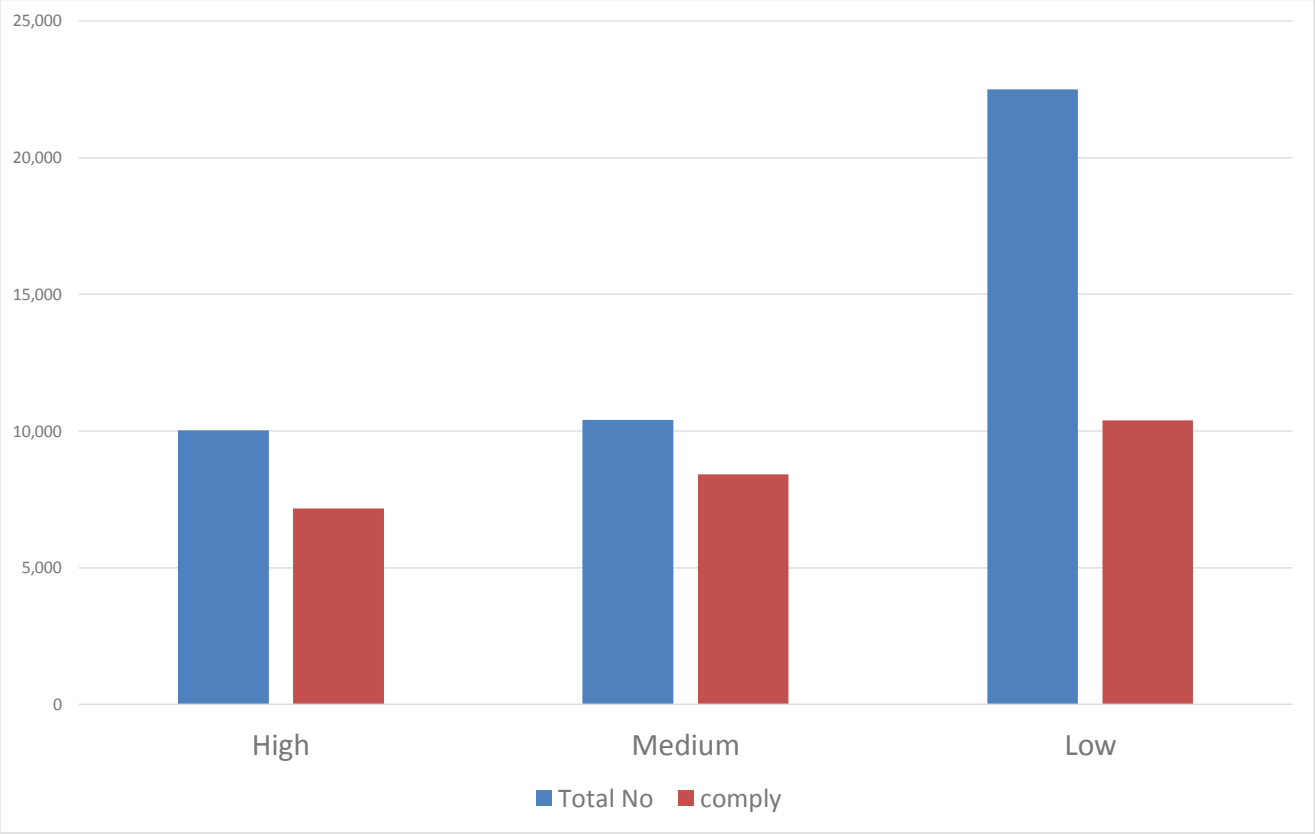
Proposed Regulations & Standards

- Proposed regulation for prescribed activities – accommodated 04 lists (IA,2A,B&C) on the basis of strict monitoring of high polluters
- Introduction of new effluent discharge modes- sea out falls (long & short), leachate, phase out existing industry specific standards.
- Introduce guidelines for irrigation of lands from treated wastewater methodically.

EPL Compliance in a nutshell



Nation wide compliance for High, Medium & low polluting Industries



Adoption of Best Available Technologies (BAT) & Best Environment Practicable Options (BEPO)

- Through registered consultant/ experts laboratory (local & International) in CEA
- By maintaining lists of consultants & laboratory up loading to CEA website for wastewater treatment, air emission control, noise & vibration control
- Laboratory accreditation and annual proficiency testing programme for registered labs.
- Organizing local & international workshops for knowledge sharing and dissemination.
- Introduction of locally developed pollution control methodologies eg. Control emission from coconut shell burning

Adoption of Best Available Technologies (BAT) & Best Environment Practicable Options (BEPO)

- Introduce cleaner production techniques in collaboration with NCPC
- National Green Award Programme to motivate & encourage industries in environment protection & management

Compliance Assistance Programmes

- Preparation of guidelines for SME sectors
- Develop low cost and affordable effluent treatment methods eg: vehicle service stations
- Soft loan (E friend I&II)schemes for pollution control activities
- Proposed tax reduction from pollution control devices
- Tri party agreement to dispose health care waste
- Corporate National E Waste Management Programme to facilitate E Waste generators.

Road Map for wastewater Discharge Fee Scheme

- Wastewater Discharge Fee –
- Is a strategy primarily aiming at reducing the pollution loading into the natural recipient (rivers, lakes, tanks, marsh land, lagoons, estuaries, etc.), in a manner that integrates and harmonizes command and control (CAC) and economic instruments.
- The objective of generating a mechanism to improve environmental enforcement and compliance status of companies under the environmental regime of the CEA.

- Objectives-
- Change to a market based system from the present administrative enforcement type of system.
- More equitable scheme for the heavy polluters paying a higher fee than a lighter polluter.
- Benefit both entrepreneurs as well as authorities by encouraging the entrepreneurs to adopt cleaner production technology, recycling wastewater and facilitate enforcement.
- In long term improvements in water quality and enable the country to achieve the water quality standards established under its classification system based on best use.
- Pollution charges give enterprises the ability to address environmental issues in the most cost-effective manner.
- The charges / revenue can be used for environmental purposes which support water quality monitoring and enforcement activities, provide funding for common wastewater treatment plants and other infrastructure and support such activities as environmental education and community outreach associated with protecting and restoring watersheds.

Legal Framework at present

- The regulations have been developed for implementation of the system and proposed NEA amendment (at present at the Dept of Legal Draftsman)will make the WDF scheme legalized.
- The CEA is already authorized by its Mandate and Powers to collect fees for discharge of wastewater and to use the funds for environmental and water resources management programs.
- The Ministry would pave the way for sharing of knowledge and experiences and thus will benefit its national application, also for industry resorting under local authorities.

Implementation Procedure of WDF

- The CEA will implement the WDF scheme in phases. Initially applied to the five (5) industrial sub-sectors that contribute nearly 90% of the total COD loading, including: Chemical sector, Food & Beverage sector, Natural Rubber sector, Textile and Tanning sectors,Industrial Zones and Estates, and Urban Wastewater Treatment Plants and Hotels and Resorts (>200 rooms).
- In phase I the COD is chosen as priority pollution parameter, later to be extended with toxic inorganic parameters like arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni), zinc (Zn), cyanide CN^-), fluoride (F^-), and sulphide (S^{2-}).
- The scheme will start with enterprises discharging more than 100 m^3/day (25,000 m^3/yr), in phase II, to be extended to enterprises discharging 10 – 100 m^3/d. The phase III for the industries discharging waste water containing toxic inorganic substances, regardless their wastewater volume.

Strengths & Weaknesses

Strengths	Weaknesses
Qualified staff	Inadequate staff
Frequent training and capacity building	Lack of monitoring
National Environmental Act. And its Regulations	Inadequate accredited laboratory facilities
	Not Enough penalties and interim sanctions

Responses to the weaknesses

- Appointment of staff (more than 100 Environmental officers for inspections)
- Establishment of Laboratory facilities at Provincial Level
- Laboratory accreditation scheme and Proficiency testing of Laboratories
- Short listing and standardization of Experts/ consultants in Pollution Control.
- Amendments to the existing Act.
  - (To include more fines and penalties, prohibition notices ie. Obtaining injunction orders) and to include provision for Wastewater discharge fee system.

Way Forward

- **Haritha Lanka Programme – National platform to launch and promote the process of achieving sustainable development.**
- **Spans from 2009 – 2016 with 10 missions**

- Mission 07 "Water for all & always"
  - Strategy 04 – keep drinking water sources free from contamination
  - Strategy 06 – enforce polluter pays principle for water pollution industries & activities
  - Strategy 08 – Reduce fertilizer leaching and eutrophication

- Mission 09 " Greening the Industries"
  - Strategy 01 - Consolidate cleaner production in industries
  - Strategy 02 - Eco Industrial parks
  - Strategy 03 – Certification of industries ISO 14000
  - Strategy 04 – Greening the supply chain
  - Strategy 06 – Incentives for environmental friendly investments

Thank you

Next Generation Compliance in Asia

Infrared Cameras and Geospatial Monitoring of Air Pollution

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Office of Enforcement and Compliance Assurance
U.S. Environmental Protection Agency
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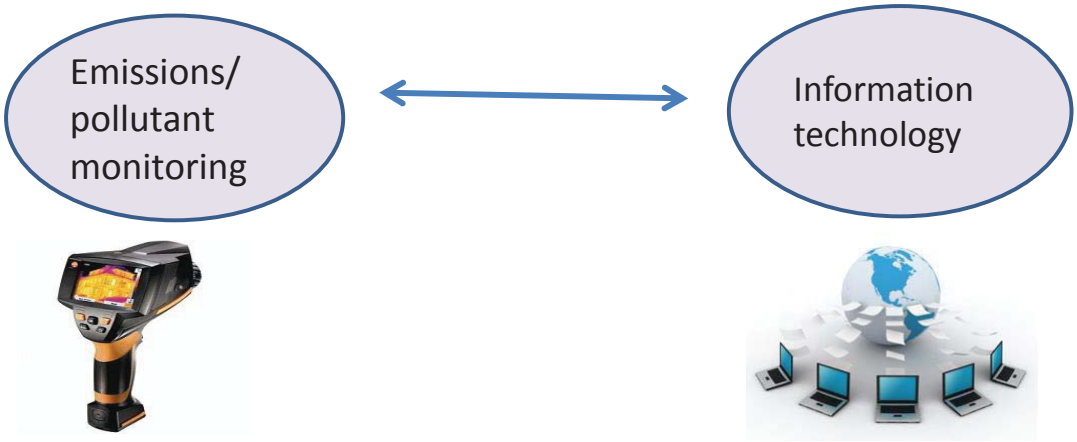
Technology Advances

The Foundation of Next Gen



- Advances in these technologies provide the means to:
  - "make the invisible visible" to industry, government and the public
  - identify new opportunities to reduce and prevent pollution
  - drive compliance through transparency and accountability
    - Data shared with Communities, industry, regulators

Advanced Pollution Detection/Monitoring Technologies
"Making the Invisible Visible"

Photo-ionization Detectors

FLIR Cameras

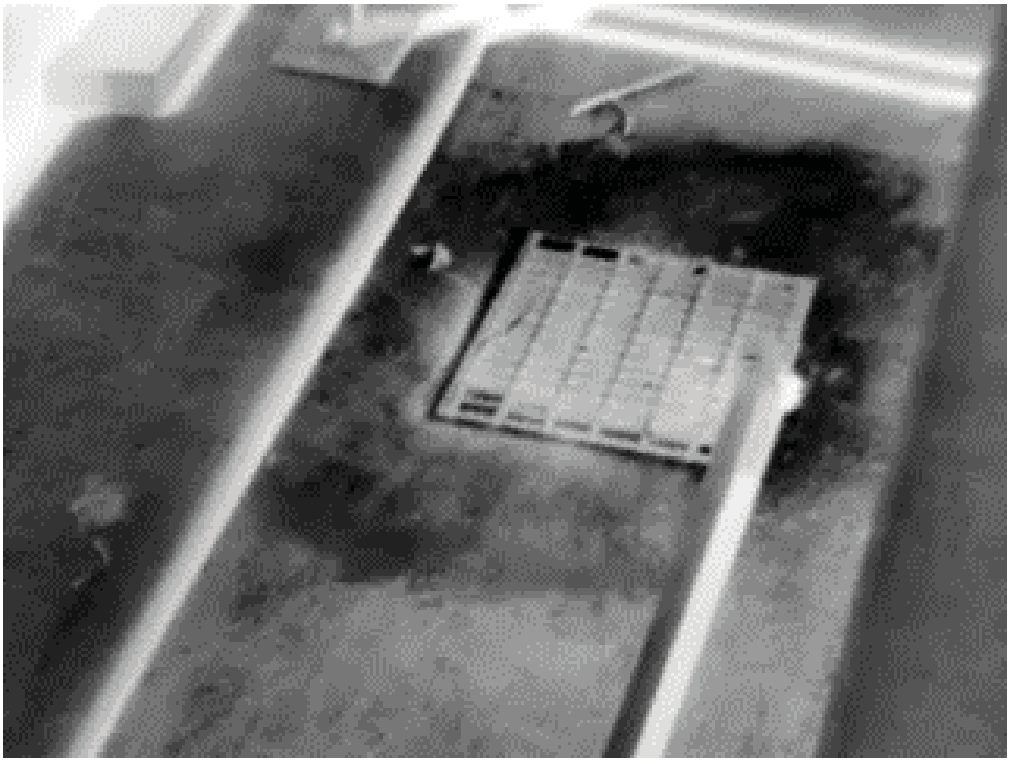
Passive FTIR Open-Path Monitors

Value of Advanced Monitoring

- Real-time monitoring – knowing about pollution as it's happening
- Facility feedback – can prevent pollution before it happens
- Fenceline monitoring
- Community monitoring
- Remote sensing

Infrared Footage of Hazardous Organic Chemical Storage

VOCs evaporating from a storm drain grate at a bulk gasoline distribution terminal



Advanced Monitoring by Government and Industry—Houston, Texas

- Used IR cameras to find actual causes of ozone problem.
- Found barges and tanks leaked.
- Industry required to report emissions.
- Industry initially did not like cameras.
- Now see value—can find and fix problems sooner, save money.
- Result is cleaner air.

Advancing Advanced Monitoring

- EPA provided states with:
  - 11 IR cameras with training
  - Support for 5 Village Green air monitoring stations
- Co-chairing with Oregon an EPA-state team
  - examine opportunities and challenges

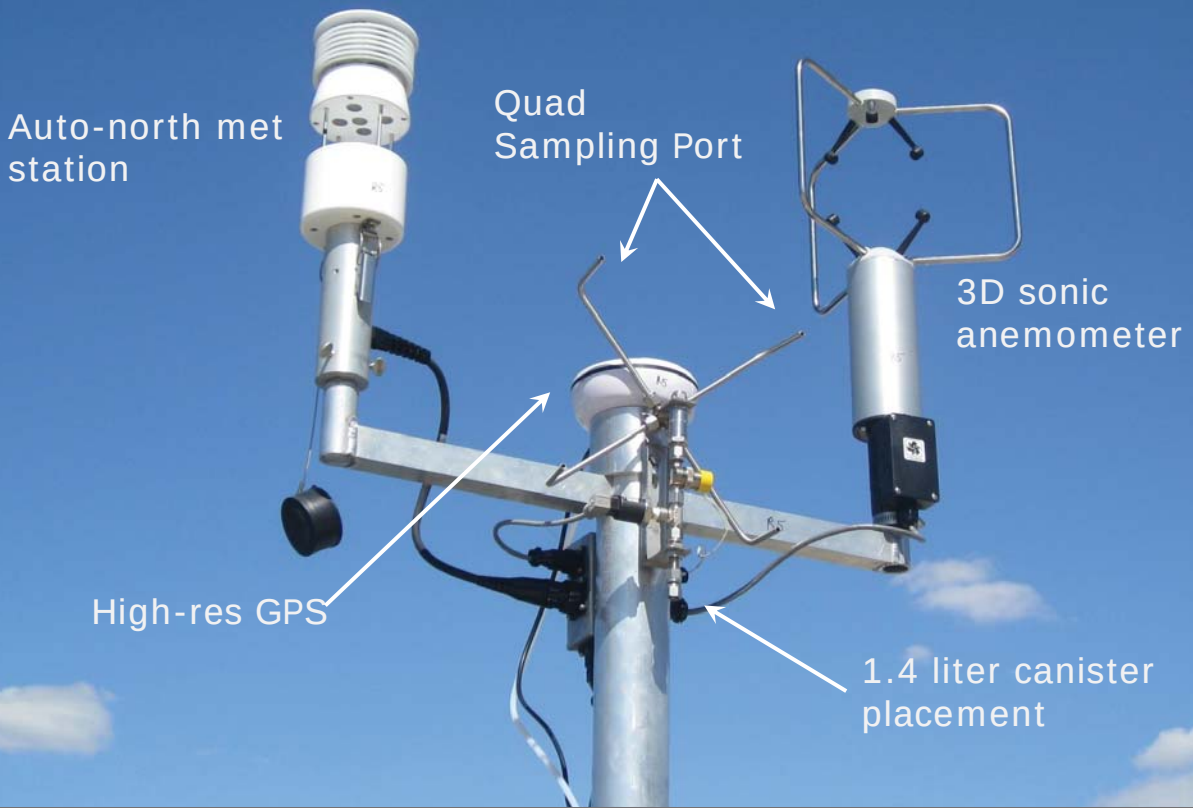
Village Greens
- Oklahoma
- Connecticut
- Philadelphia, PA
- Washington, DC
- Kansas

Infrared Cameras
- R1 - New Hampshire
- R2 - New York, New Jersey
- R3 - West Virginia
- R4 - Kentucky
- R5 – Michigan, Hamilton County, OH

R6 - New Mexico, Louisiana
R8 - North Dakota
R10 - NW Clean Air Agency/Puget Sound Clean Air Agency, WA

GMAP REQ measurement equipment

In the truck:
High-precision CH_4 and BTEX instruments, batteries, control system, IR camera, rangefinder



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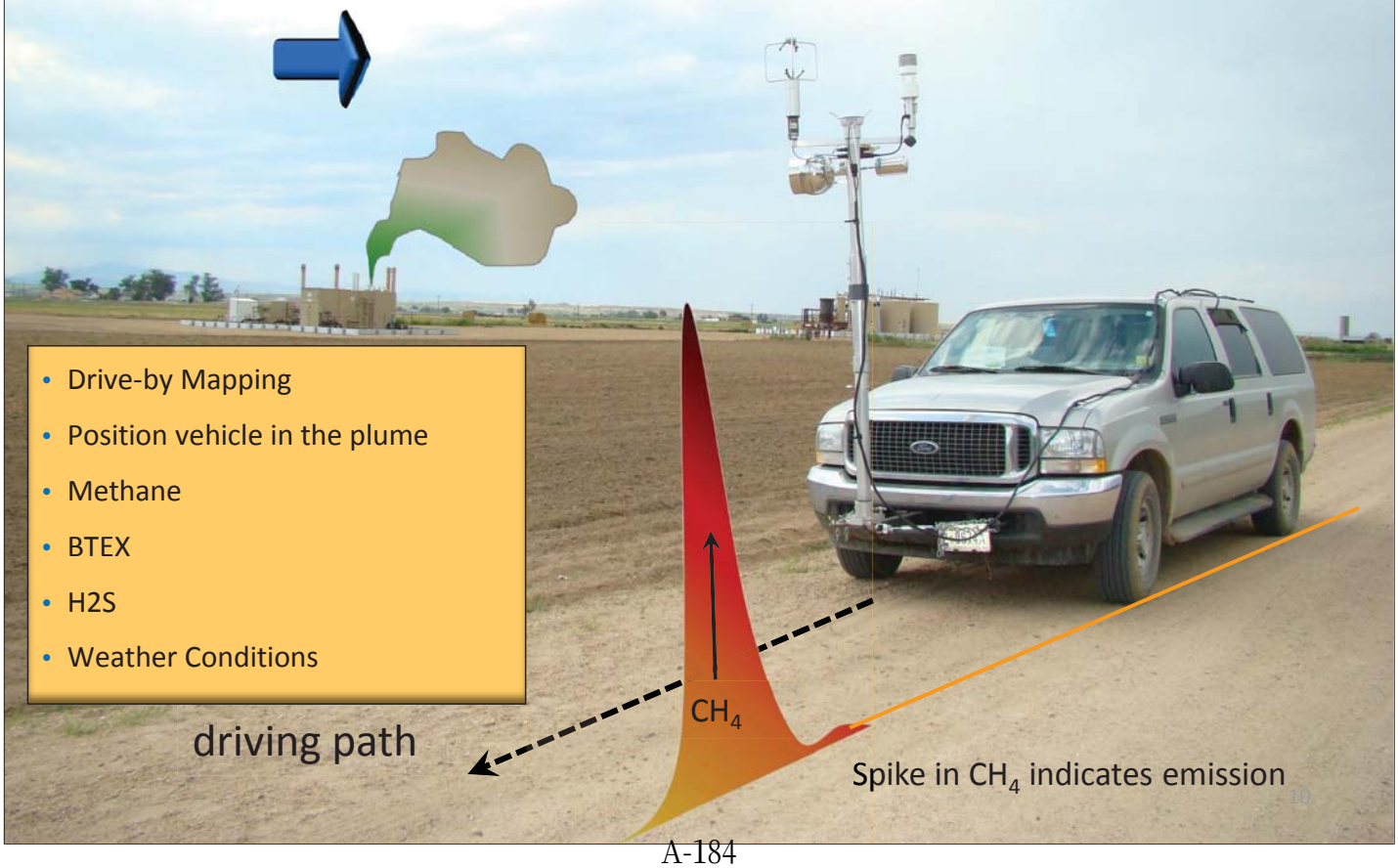
Off-site assessment with *GMAP-REQ*

(Geospatial Measurement of Air Pollution – Remote Emissions Quantification)

wind direction



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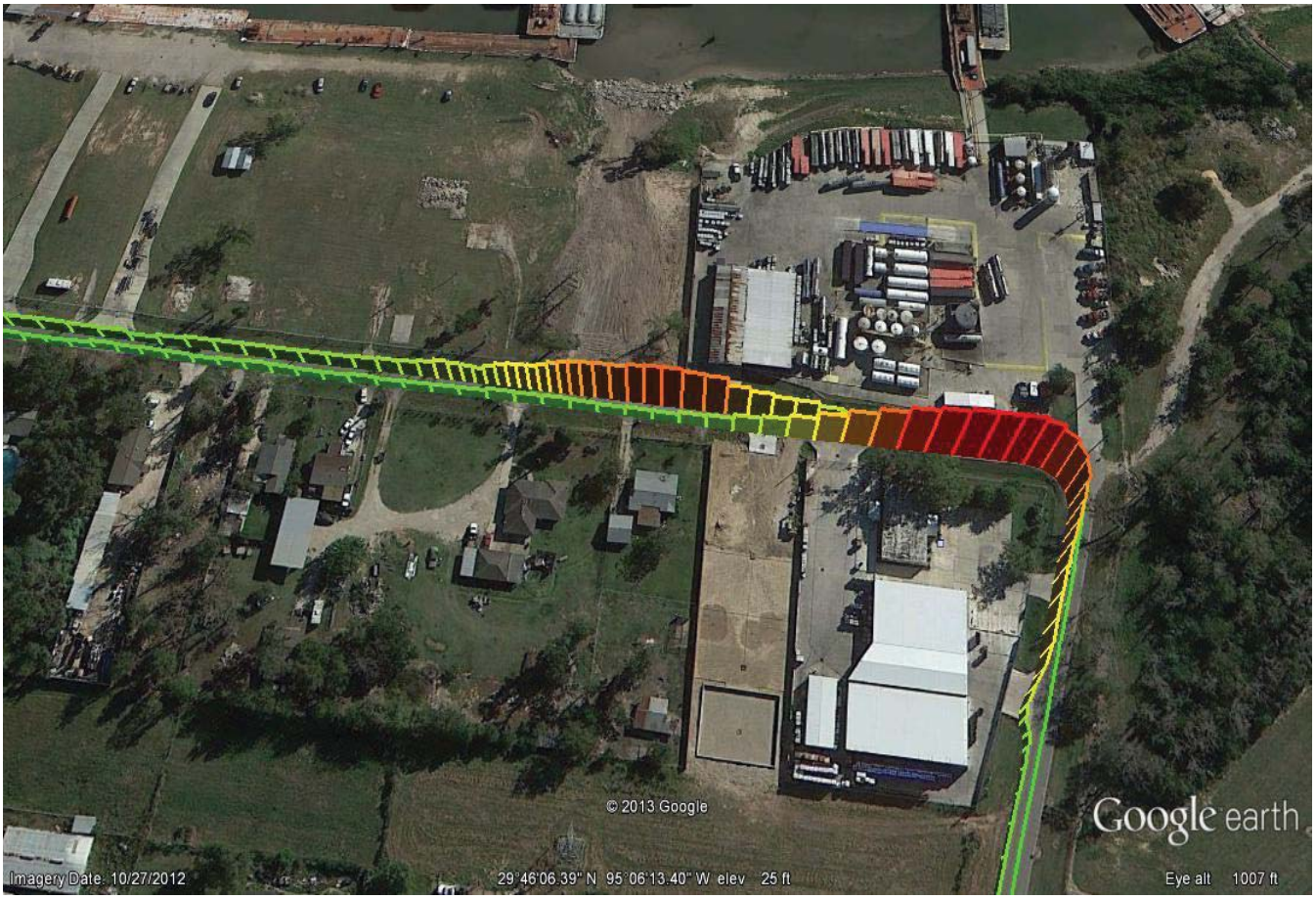

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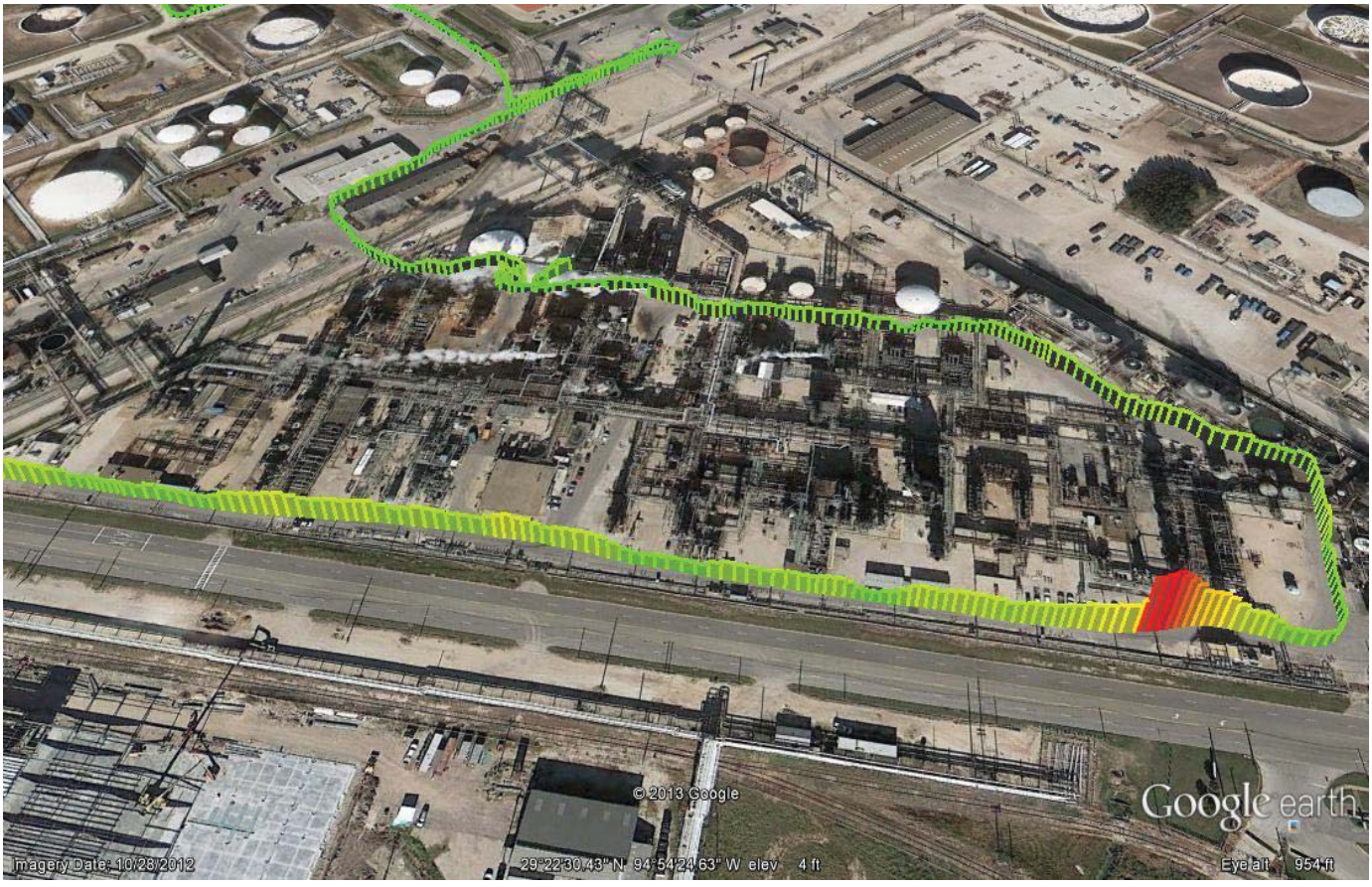
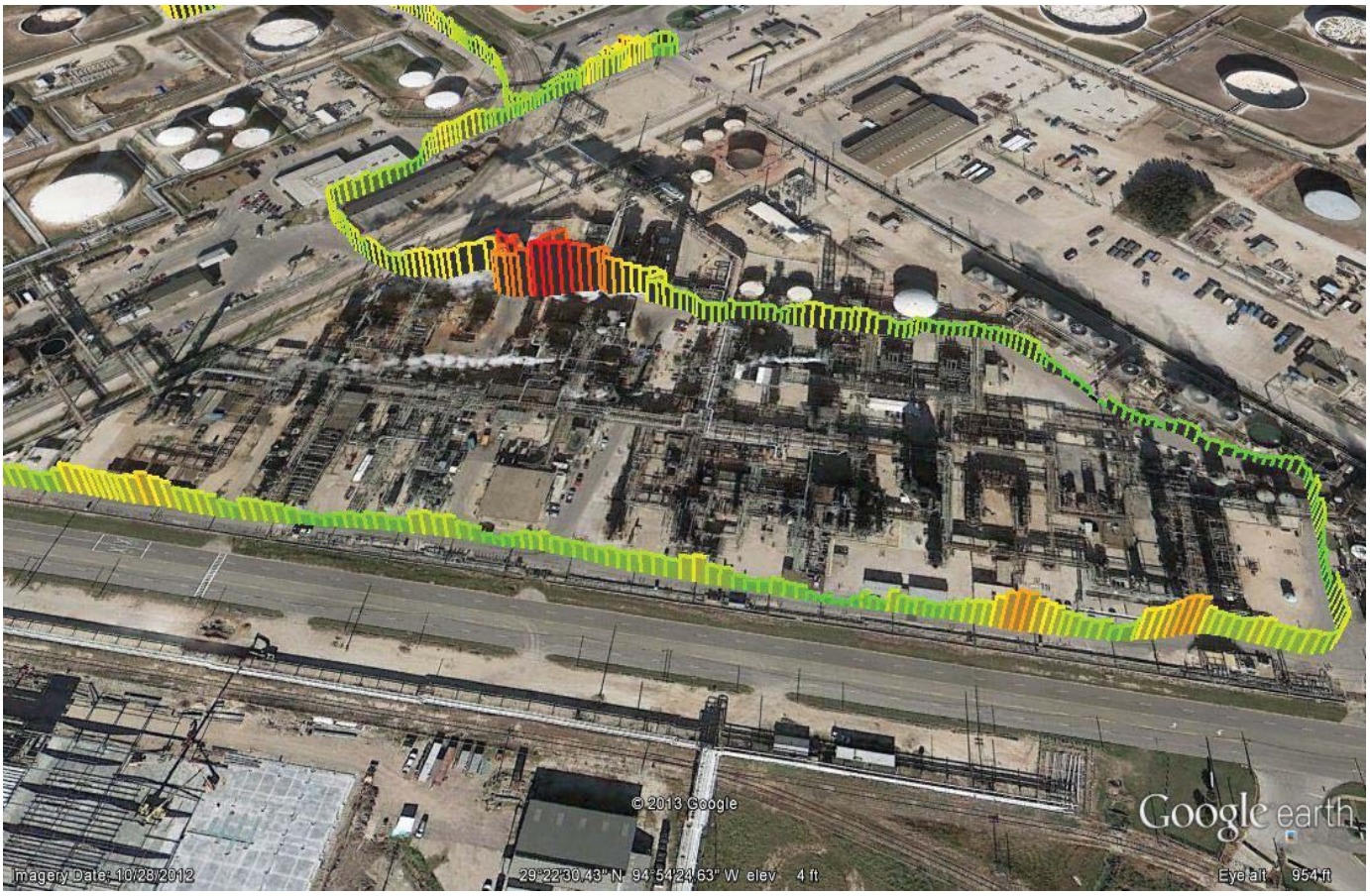
05/01/13 Benzene Mapping Route

7

05/01/13 Benzene Mapping Segment 8



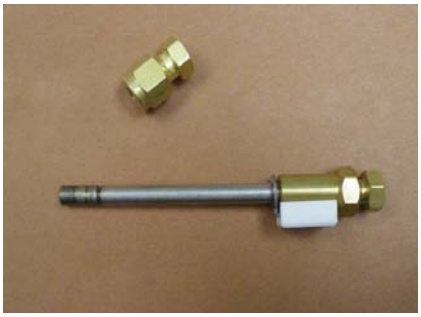
Benzene Map 1, winds from North, 04/24/13 10



Toluene Map 1, winds from North, 04/24/13

Diffusion Tubes

- Fence-line monitoring
- Limited chemicals ~ 20 (Benzene, Toluene, etc.)
- Long-term average concentrations (1 - 2 weeks)
- Placement important
- Need meteorological data



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Diffusion tube sample locations (ppb)

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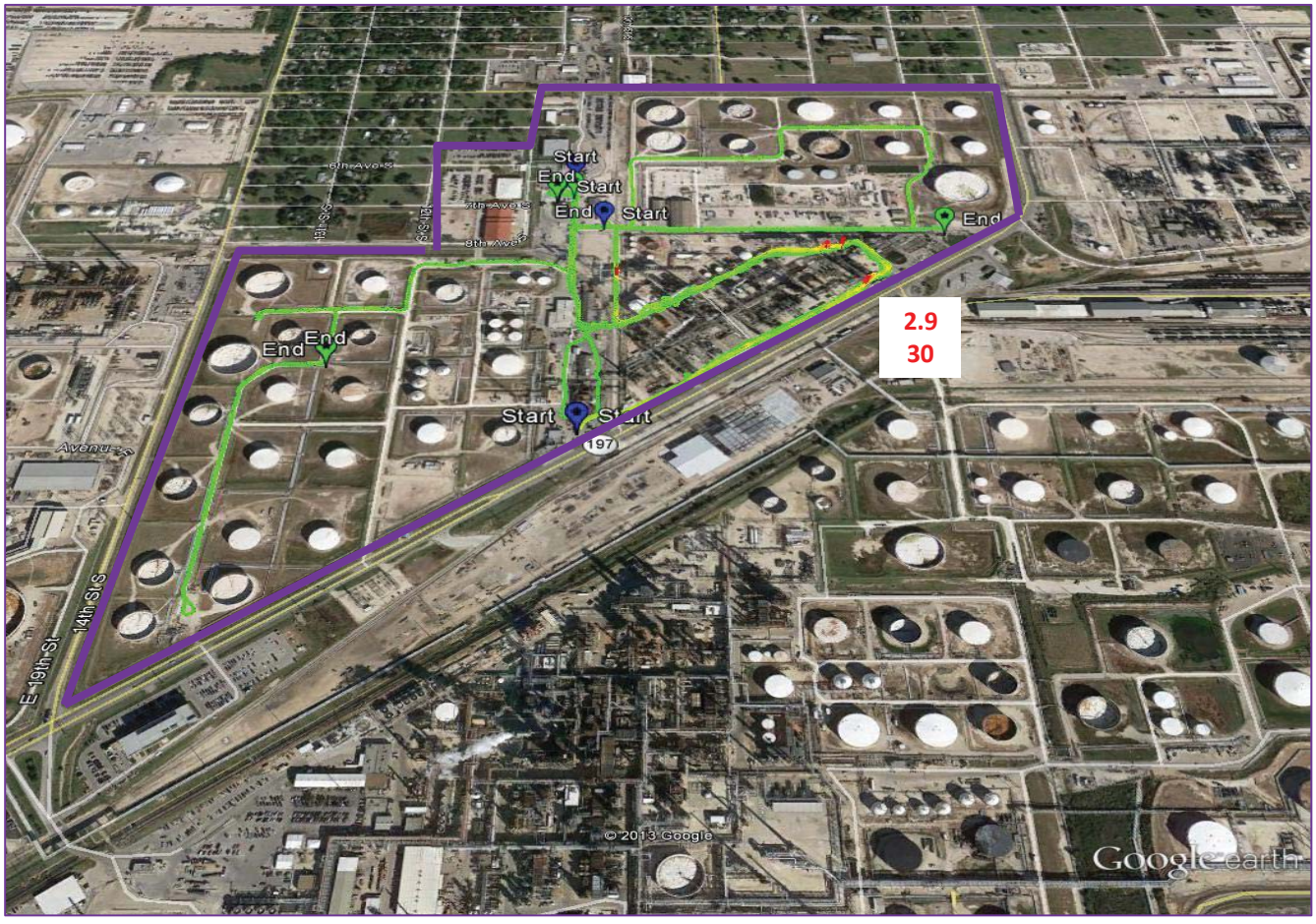

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Conclusion

- Adaptable Mitigations Measures and Permit Conditions
  - Monitoring and treatment technologies change
  - Periodic review/renewal
- Regulators should encourage advanced monitoring with project proponents
- Monitoring should drive:
  - Compliance
  - Efficiency
  - Improved protection
  - Public awareness

Additional Information

- *Next Generation Compliance*, by Cynthia Giles
  - The Environmental Forum, Environmental Law Institute, Aug. 2013
  - http://www2.epa.gov/compliance/next-generation-compliance
- *The Changing Paradigm of Air Monitoring*
  - Environmental Science and Technology, ACS Publications, Oct. 2013
  - http://pubs.acs.org/doi/abs/10.1021/es4022602

附錄22、泰國陶氏化學泰國有限公司「專題討論：企業針對遵守環保法令的觀點」簡報

Corporate and Public Perspectives on Environmental Compliance

September 22, 2015

Dow.com

Contents

- About Dow
- Challenges
- Our Approach

About Dow

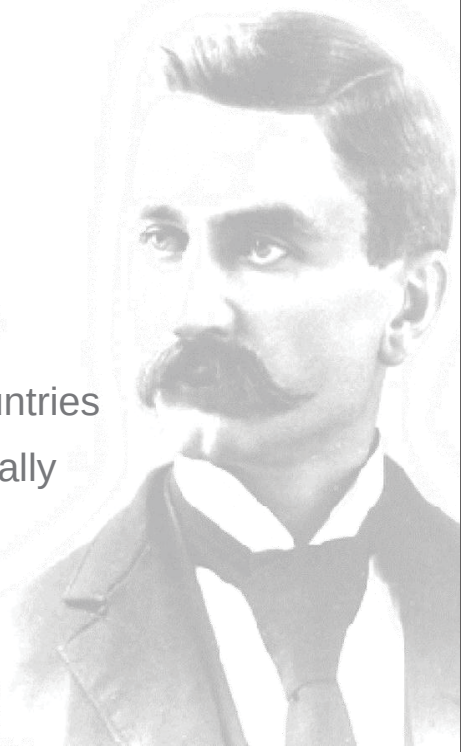
A science and technology leader with annual sales of $58 billion

Founded in 1897 by Herbert H. Dow in Midland, Michigan

Supplies plastics and chemical products to customers in 180 countries

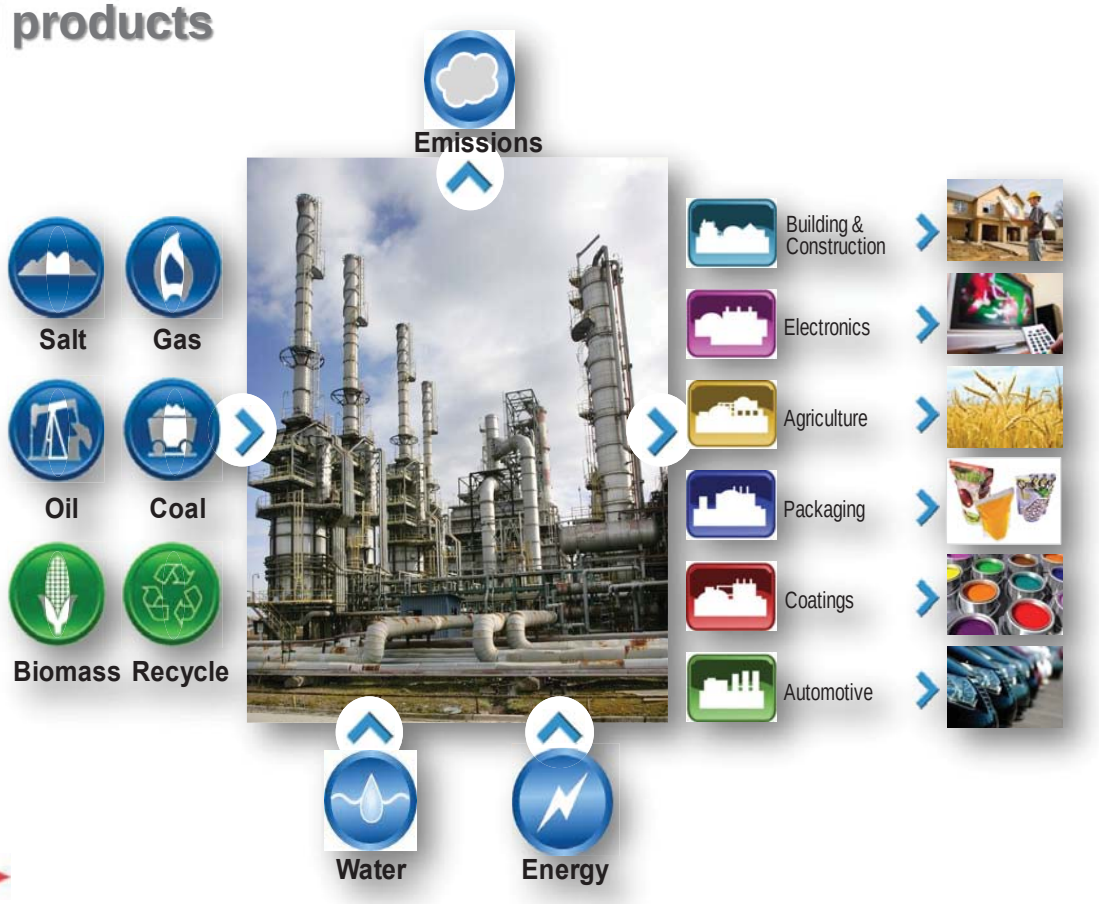
From 201 manufacturing sites in 35 countries

Employs more than 53,000 people globally



"If you can't do it better, why do it?"
-- Herbert H. Dow

Enhancing the sustainability of our processes and products



Licenses to Operate

- Regulatory Compliance
- Society/Community Expectations

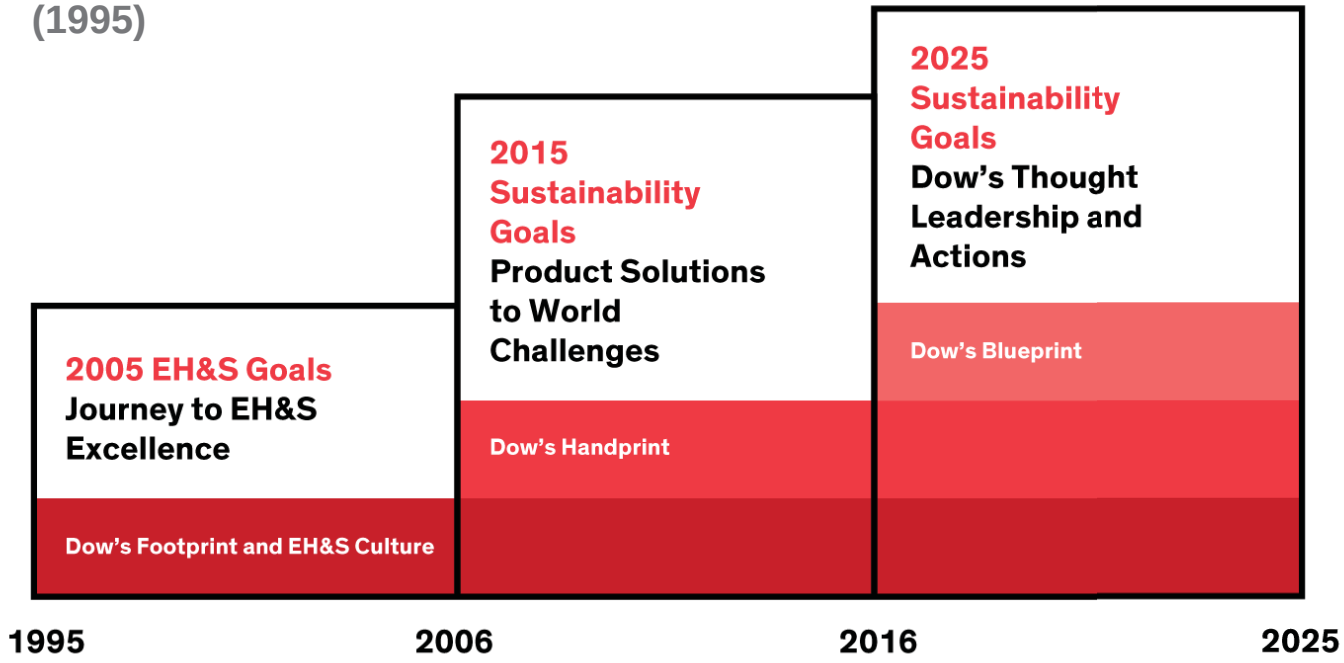
Challenges

- Regulatory Development
- Review/Approval Process
- Enforcement
- Stakeholder Expectations

Our Approach

- Commitment to Improve: 2005/2015/2025 Goals
- Technology Advancement
- Stakeholder Engagement

Dow's 2025 Sustainability Goals introduce the notion of a collaborative *blueprint* for sustainability, building upon previous ten-year commitments focused on the company handprint (2006) and footprint (1995)



Footprint: World-leading operations and supply chain perfomance
Handprint: Products and services that help customers meet their challenges
Blueprint: Changes in technology, public policy, and the value chain that lead human society toward sustainability

2005 EH&S Goals delivered significant results

EH&S Improvements

Reduced solid waste by 1.6 billion pounds

↓

Waste savings that could have filled 415 football fields 1 meter deep

Saved 900 trillion BTU of energy

↓

Energy savings that could have powered 8 million single-family homes for a year

Reduced water use by 183 billion pounds

↓

Waste savings that could have served 170,000 homes for a year

Injury & illness rate reduced 84%

↓

>10,000 Fewer injuries due to enhanced focus on safety

Economic Savings

From energy efficiency (>$4B) and avoided costs

Invested $1 billion

↓

Saved $5 billion

2015 Sustainability Goals

By 2015, we will reduce our greenhouse gas emissions 2.5% per year – from a 2005 baseline.

We will reduce our energy intensity 25% by 2015 – from a 2005 baseline.

We are actively working toward, and committed to achieving, at least three breakthroughs by 2015 that will significantly help solve world challenges.

We will publish product safety assessments for all products by 2015.

By 2015, Dow will achieve on average a 75% improvement of key indicators for EH&S operating excellence from 2005 baseline.

By 2015, 100% of Dow sites where we have a major presence will have achieved their individual community acceptance ratings.

By 2015, Dow will increase the percentage of sales to 10 percent for products that are highly advantaged by sustainable chemistry.

Delivering Breakthroughs to World Challenges

Food:
Omega-9 Healthy Oils

~1.5 billion
pounds of trans and saturated fat eliminated

Water:
DOW FILMTEC™ ECO Reverse Osmosis Elements

40% better
purification with 30% less energy

Transportation:
BETAMATE™ Structural Adhesives

23.3 million
metric tons of CO_2 emission avoidance

Health:
POLYOX™ Water-Soluble Polymers in Lifebuoy™ Soap

45% reduction
in preventable disease from handwashing with soap

Dow's 2025 Sustainability Goals: Maximizing Economic, Environmental and Societal Value

Overview

Dow is redefining the role of business in society.

Dow's Aspiration:
- Dow advances the well-being of humanity by helping lead the transition to a sustainable planet and society.
- Dow maximizes economic, environmental and societal value.

Dow's Approach

Footprint	Handprint	Blueprint
World-leading Operations Performance	Product Solutions to World Challenges	Dow's Thought Leadership and Actions

Delivering Solutions to Global Challenges

Among Our Key Performance Indicators*

0 Zero severe unplanned safety events and process safety events	10 impactful "blueprint" collaborations	6X net positive impact on sustainable development measures	100% value chain and stakeholder support in safe use of chemical technology
20% reduction in water intake intensity and waste intensity	400 MW of its power demand from renewable sources by 2025	$1B in nature-enhancing projects	1B people positively impacted by Dow employees

* KPIs are not all-inclusive but are an overview.

Introducing Dow's 2025 Sustainability Goals

Unlocking the Potential of People & Science

The passion and creativity of people drives innovation at the intersection of the sciences, generating value for business, humanity and the environment.

Valuing Nature

Too frequently taken for granted, nature provides valuable services – like clean air and water – to us all. Dow considers nature in strategic decisions because it is the right thing to do for people, planet and business.

Building Courageous Collaborations

The health of people, planet and business are intrinsically linked. Collaboration in new and deeper ways across the public and private sectors is essential for the transition to a sustainable planet and society.

Delivering Breakthrough Innovations
Dow's product portfolio will have a six-fold net positive impact on sustainable development.

Engaging Employees for Impact
Dow employees worldwide will apply their talents to positively impact the lives of 1 billion people.

World-Leading Operations Performance
Dow will protect the health and safety of Dow people and others touched by our supply chain, while maintaining world-leading environmental operations performance.

Valuing Nature
Dow will deliver $1B USD in net present value through projects that are good for business and good for ecosystems.

Dow will evaluate the impacts on nature and the business benefits that nature can provide in capital, real estate and R&D projects.

Leading the Blueprint
Dow will lead a collaborative effort to develop a blueprint for a sustainable planet and society, integrating public policy, science, technology, and value chain innovation.

Advancing a Circular Economy
Through innovation and collaboration, Dow will help facilitate the world's transition to a "Circular Economy," where "waste" is designed into new products and services.

Increasing Confidence in Chemical Technology
Through transparency, dialogue and unprecedented collaboration, Dow will increase confidence in the safe use of chemical technology.

Over the next decade, Dow will continue to reduce its own **operational "footprint,"** deliver ever-increasing value to customers and society through its **"handprint" of products and solutions,** and develop and deliver a **"blueprint" for a sustainable planet and society.**

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Community Partnership Association

Established : June 23, 2010

Association Registration : May 24, 2011

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CPA Mission

Beyond CSR

- To sincerely take care of communities as our family
- To focus on health and education development of the communities

Green Operations

- To be the role model of high safety and environmental standard and environmental management
- To support 'manufacturing friends' in MTP to lift up their operational standard

Communications

- To educate communities to have better understanding about the industries in Map Ta Phut and encourage them to participate and be part of CPA activities

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Community Partnership Association