



The Dow Chemical Company: The Inseparability of Safety and Business Success—Teaching Note

Case Overview

In 1995, senior executives at The Dow Chemical Company designed and implemented a 10-year environmental, health, and safety (EH&S) plan aimed at reducing the company's chemical emissions, spills, injuries, and water usage. These goals were lofty, but EH&S excellence was critical to Dow's success. From 1995 to 2005, Dow standardized EH&S best practices across its global business units and communicated its progress to internal and external stakeholders. By 2005, Dow had achieved most of its EH&S goals, and Dow CEO Andrew Liveris tasked Lawrence Washington, Jr., vice president of EH&S, with drafting a 2015 plan that would set a new standard. Cost-benefit analysis of the changes made to meet the 2005 goals showed that \$1 billion invested in improvements to reduce energy use, wastewater, and chemical emissions resulted in an overall value to the company of more than \$5 billion. The Total Business Cost Assessment of improvements to process safety, personal safety, environmental releases, and transportation incidents revealed an additional \$950 million in savings. Liveris advised Washington to take into account that he and other executives were considering several alternatives for the future.

Status quo was not an option for Dow. Firm believers in environmental performance and safety, Dow executive staff knew that the EH&S goals were not only the right thing to do, but also helped improve the company's bottom line. Dow had clearly demonstrated that setting aggressive goals could make a difference in EH&S performance and boost profits. At the same time, Dow leadership was feeling external pressure from the communities in which it operated, shareholders, industry peers, government and regulators, and the company's own Corporate Environmental Advisory Council to implement a plan that was even bolder than the first. The new plan would have to reinforce Dow's commitment to the health and safety of its workers and to the environmental sustainability of communities it operated in around the globe, while appealing to investors and the company's bottom line. It would have to be more specifically linked to the company's strategic goals and aspire to make a positive difference in the world.

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Teaching Objectives

For Undergraduate Students

Upon completion of class discussion, undergraduate students will be able to:

- Describe how businesses use metrics and benchmarks to assess EH&S performance.
- Examine how EH&S performance affects an organization. Take one of the EH&S goals and define a strategy that will assist Dow in meeting that objective.

For Graduate Level Engineering and EH&S Students

After discussing this case, undergraduate and graduate engineering students will be able to:

- Describe how an organization assesses its EH&S performance and how it is viewed by stakeholders and industry peers.
- Evaluate the business advantages of setting world class EH&S goals.
- Understand and demonstrate how a business translates corporate vision into department goals and objectives.
- Summarize how an EH&S leader builds a case for senior leadership to move EH&S from compliance to fundamental business strategy to industry excellence.
- Set a series of annual goals that delineate a path for plant managers and others to follow in working toward stretch goals; predict the resource demands and organizational changes that will be required.

For Master of Business Administration Students

Upon completion of the case, graduate level business students will be able to:

- Examine how EH&S performance positions an organization in the global marketplace.
- Identify the potential advantages and disadvantages of an EH&S plan, and build a business case for an EH&S emphasis.
- Predict the resource demands for an EH&S initiative.
- Establish a plan to obtain employee commitment to an EH&S initiative, communicate progress internally and externally, and address any missed targets.

Case Pedagogy

This case can be used in undergraduate business courses, graduate engineering and EH&S courses, and graduate level business courses.

Case Analysis

Questions for Case Preparation

Undergraduate Business

1. What metrics do businesses use to assess performance in the areas of employee health, worker safety, and environmental stewardship? Are these metrics lagging or leading indicators? How can they be used to drive improvement?

2. Compare and contrast the costs and benefits of poor performing EH&S programs with those of top-performing organizations. Why do some organizations strive for excellence while others are satisfied with minimal compliance?
3. Take one of the EH&S goals and identify one specific initiative or activity that assists the organization in meeting that objective. How is performance measured for that activity?

Graduate Course in EH&S or Engineering

1. How do businesses select appropriate benchmarks to assess current performance in the areas of employee health, worker safety, and environmental stewardship? Identify objectives for the various levels of authority overseeing the EH&S function.
2. Identify the business advantages of becoming an EH&S industry performer. What strategies can an EH&S leader use to motivate senior leaders to view EH&S excellence as a fundamental business strategy worthy of investment?
3. Choose one of the long-term goals set by the CEO, and write short-term or annual goals for a plant manager working toward that objective.
4. What changes in personnel resources are required to move a large corporation's EH&S culture from baseline compliance to EH&S industry leader?

Master of Business Administration Courses

1. Does a company's EH&S performance significantly affect its position in the global marketplace? Which stakeholders care and what are the ramifications of poor, average, and outstanding EH&S performance for these stakeholders?
2. What core business practices are affected by an EH&S emphasis? What are the competing resource demands for an organization that decides to pursue a business strategy for achieving EH&S excellence?
3. How do leaders in a large organization like Dow share a corporate vision with internal and external stakeholders? How is buy-in achieved? How does an organization communicate progress and how does it address missed targets?

Introduction

It may be helpful to begin class discussion with an overview describing EH&S, the business issues and stakeholders involved, and why businesses care about these issues. The overview can include the perceptions that EH&S drains an organization of resources, offers few tangible benefits, has intense data requirements, and rarely helps sell products. However, experienced executives and managers often realize that if they ignore EH&S, catastrophic incidents can occur that can severely damage the image of an organization. History offers many examples of companies that have been profoundly affected by EH&S issues:

- **Prince William Sound, Alaska.** In 1989 the Exxon Valdez spilled over 11 million gallons of crude oil, killing approximately 250,000 seabirds, 3,000 sea otters, 300 harbor seals, 250 bald eagles, and 22 killer whales.¹
- **Gulf of Mexico, US.** In 2010 an offshore oil rig explosion spilled 205 million gallons of crude oil, leaving 11 people dead and 17 injured, while killing or maiming 82,000 birds, 6,000 sea turtles, 25,000 marine mammals, and various species of dolphin.^{2,3,4}
- **Times Beach, Missouri.** In 1971, to reduce dust on city streets, oil containing the toxic chemical dioxin was sprayed onto streets, killing 62 horses and leading to a complete evacuation of the town. The town was quarantined for the next two decades before it was reopened to its previous inhabitants.

- **Chicago, Illinois.** In 1983 workers unknowingly were exposed to cyanide gas while treating used film reels, causing one worker's death.⁵
- **Hamlet, North Carolina.** In 1991 a fire broke out in a chicken processing plant that had locked its doors the previous night to prevent theft. The fire left 25 workers dead and 57 injured.⁶

Instructors may allow students to discuss the direct financial costs of these disasters on the organizations involved. These costs are often dwarfed by the continuing costs associated with litigation and consumer and shareholder boycotts. Poor EH&S performance at one company can have consequences for other companies within the same industry. Incidents lead to more regulatory action and significant pressure within industries to avoid future disasters.

EH&S Performance Assessment

After discussing the impact of these disasters, the instructor can provide an overview on how leading and lagging indicators can be used to effectively measure EH&S performance and prevent future disasters. Nearly all companies use lagging indicators, or events that have already occurred, to measure EH&S performance. These measurements can be viewed as benchmarks for EH&S progress including avoidance of injuries, illnesses, and environmental spills. OSHA, for example, requires employers to report the number and severity of injuries and illnesses that occur each year. An "OSHA frequency rate" can be calculated as follows:

$$\frac{\text{Recordable injuries} \times 200,000}{\text{Person-hours worked in one year}}$$

The constant 200,000 is used to show that 100 people work roughly a total of 200,000 hours a year. This shows a rough approximation of the percentage of employees injured. Metrics like these can be used for trend analysis, but they are ultimately historical values. Where lagging indicators measure failures, leading indicators measure proactive performance. Companies develop leading indicators to reduce the risk of negative events including injuries and environmental spills. Leading indicators can include the percentage of employees trained on required program elements, inspection scores, response times, number of risk assessments completed, and audit scores. Dow used a number of both lagging and leading metrics tailored to various levels of management. It is suggested that students pick these metrics out of the case description and identify them as either leading or lagging. Many companies report these statistics in annual reports. Just as financial reports may contain comparisons with industry peers to demonstrate financial security and profitability, reporting low injury rates and emissions demonstrates corporate responsibility and stewardship. Investors want to know that the companies they own uphold strong social values.

Adopting EH&S as a Fundamental Business Strategy

Excellence in EH&S is not cheap. Effective EH&S programs require leadership from highly skilled professionals who command above average salaries, as well as an intensive EH&S employee training programs. Significant capital investments are required to install systems such as ventilation, waste handling and treatment, spill containment vessels, and automated process monitoring. Operating costs also grow as emphasis is given to scheduled preventive maintenance, frequent process monitoring, and supervisory attention.

One of the biggest challenges EH&S professionals face in convincing senior leaders to make these types of investments is the inability to positively identify how many incidents will be prevented. Dow's decision to invest more heavily in its EH&S program was remarkable despite the uncertainty over the program's potential financial gains. While some may argue that Dow was lucky to achieve outstanding EH&S results, progress is not made without commitment and investment. The key to return is time horizon. While expenditures on

equipment may yield immediate improvements in environmental emissions, it often takes years to see ROI on safety improvements, training, and mindset. By setting a long-term vision and measuring progress over a 10-year horizon, Dow's leadership gave itself a realistic time frame over which it could expect to see real changes and benefits.

Companies that fail to give safety programs enough time to yield significant results will often discontinue their EH&S programs. When confronted with a disaster, company leaders often go into panic mode, making rapid decisions in the hope of curtailing the after effects. It should be recognized that there was an intrinsic human element associated with the Dow initiative. Some people assert that people inherently like to do good. Given a choice, most people would rather not injure others, contaminate the environment, or work inefficiently. Dow's EH&S initiative allowed employees to feel good about their efforts because it reinforced these values and empowered workers to reach goals. While these benefits are difficult to quantify financially, they are reflected in lower levels of turnover and absenteeism, and more loyalty and support for the organization.

Achieving EH&S Integration Throughout an Organization

Vision without execution is simply dreaming. When Dow's senior leadership decided that it could make the organization stronger and better by elevating EH&S excellence, it had a good idea of what level of performance it would like to achieve in 10 years. Dow's senior leadership also knew that dramatically improving its EH&S performance would be challenging and would require significant organizational changes. After identifying the objectives of the EH&S programs, Dow's senior leadership defined the tactical level steps to achieve these objectives.

In addition to performance metrics, four elements seem to have been key to Dow's success in integrating EH&S objectives into its business fabric: communication, goal setting, culture change, and reorganization.

Communication

It is suggested that students discuss both the internal and external communication processes that accompanied the EH&S initiative. Communication allows organizations to accomplish their objectives. Internal communications are necessary to instill a shared understanding of goals, muster support for meeting challenges, and assess performance. Some points to address include:

- Who were the key EH&S advocates and who was their audience? Who was promoting other agendas, and what were those messages?
- What messages were transmitted at different levels in the organization?
- How did the content of messages change over time?
- How did the sources and direction of EH&S communications change over time?
- What media were used to transmit/exchange information?
- How did the frequency of communications change over time?
- Assuming that the internal communications stream initially followed a top-down model, how did the communications reporting relationships look at the end of 10 years?

It is important for students to understand that communication networks can be a huge asset if planned and used wisely, enabling an organization to work efficiently. However, without controls and management, communication processes can become clogged with differing messages that lead to confusion, loss of direction and focus, and organizational inefficiency. Dow was largely successful in working toward its objectives because it clearly communicated its goals, performance metrics, courses of action, and achievements. It achieved efficiency and overcame hurdles by ensuring its employees knew the plan of

action, their role in it, and how that action could be coordinated in a timely fashion. Just as a steering wheel enables a driver to stay on course, the company's communication system enabled senior leadership to steer around bumps in the road to keep moving toward its EH&S goals.

In managing communications systems, it is important to consider the sources of information that need to be communicated, the channels through which those messages should be conveyed, and how the communications should be monitored. Attention to information filtering may be required. Dow's EH&S communications were frequent and consistent. This enabled the organization to maintain its EH&S focus over the 10-year plan.

Goal Setting

Employees at each level of Dow's organization were held accountable for meeting performance metrics. The instructor is encouraged to lead students in a discussion of how to set both long-term and short-term goals, as well as how to execute those objectives at managerial and tactical levels. Dow established a challenging set of goals that included reductions in waste, emissions, spills, energy and water usage, and injuries. Senior leaders would decide the level of improvement that would be needed each year to reach each 10-year goal. They would also assign organizational responsibility across the company's global business units. Global business unit managers would then be responsible for communicating standardized goals at the business level. Functional employees would communicate the changes they felt were necessary up the chain of command.

Consider the goal of achieving a 90% reduction in the injury rate over 10 years (lagging indicator). Knowing the current number of injuries and the derived injury rate, senior leaders would establish a target for injury reduction for each Dow global business and for each year. The global business managers would then subdivide this goal into targets for each of their operating units. Simply setting numerical targets, however, will not assure success. The company must reduce the risk of injuries to employees by decreasing exposure to hazards and by helping employees avoid injuries around hazards that cannot be eliminated. Leaders would know that to achieve these reductions, changes would need to be made regarding how the business operates. To improve safety, for example, employees would need better training to reduce errors that cause accidents; supervisors would have to do a better job of encouraging safe behaviors; new and refurbished equipment would have to be inherently safer than existing machines; and process changes would have to be more carefully planned and implemented. Each of these changes required leadership, effort, and technical support.

In addition to injury rate goals, the operating managers were given goals for worker and supervisor training, design reviews for capital projects, and developing improved processes for planning and managing changes. This is a good opportunity for students to identify other areas that are suitable for goal setting to improve Dow's EH&S performance. Further examples include:

- Improvements in accident investigation and reporting
- Recognition for employees who identify and make suggestions for safety improvements
- Implementation and monitoring of a safe behavior observation program

Goal setting to reduce downtime or maintenance hours associated with correcting safety at the employee level might include:

- 100% attendance at safety meetings
- Completion of assigned safety training modules
- Behavior observation of coworkers to ensure safe practices were followed and appropriate recognition and reinforcement were delivered

- Reporting near miss accidents or previously unidentified hazards
- Ensuring that other work team members complete the year without injuries
- Achieving an above average housekeeping score for the team's work area
- Obtaining zero infractions for safety violations
- Reviewing safe operating procedures with a supervisor and making suggestions for improvement
- Achieving 100% compliance with machine lock-out procedures
- Participating in root cause investigations of incidents or near miss events

For purposes of time management, it may be helpful to divide the class into small working teams to create sets of goals. One team could set goals for the EH&S vice president, a second for a global business manager, a third for a plant manager, a fourth for a production or maintenance superintendent, a fifth for a line supervisor, and a sixth for a production worker. Students should be encouraged to include both lagging and leading metrics as the basis for performance goals.

Culture Change

Dow had to make fundamental changes in how it did business to achieve the results that it did. It needed to change how employees at all levels of Dow's organization viewed risk and what constituted an acceptable level of risk. It also required buy-in and active support from employees doing the functional level work of reducing the company's environmental footprint, improving efficiency, and avoiding unsafe shortcuts. The process of empowering employees to engage in and even lead changes required managers to share their control, becoming facilitators rather than directors, while accepting full accountability for their team's results. Employees at all levels had to view both Dow and their role in the organization differently.

To achieve this change in employee viewpoint, the EH&S culture of Dow's organization had to change. Though Dow had a strong and proactive EH&S program prior to 1995, it decided to strive for greater excellence and engagement to achieve and sustain world-class performance in EH&S. Dow had to move the needle from reacting to hazards as they happened to proactively seeking opportunities for designing and operating systems that were inherently safer. Significant investments were made to reduce Dow's injuries, spills, emissions, energy consumption, and employee injury. The capital expenditures made for these changes reinforced that Dow was serious about its EH&S priorities.

Consistent communication, properly aligned goals, and definitive actions resulted in cultural changes that were necessary to achieve improvements in EH&S performance. Employees had to take ownership for their own activities and work, as well as hold their coworkers accountable. These types of cultural changes require long-term commitments. EH&S and business leaders seeking such changes must foster employee commitment and remove resistance to change. Coaching and performance assessment are the traditional tools for driving management changes.

One important cultural aspect to discuss is the perception of ownership. Do employees see the safety program as "their" program or as "our" program? Do managers reluctantly accept goals that are handed to them, or do they embrace goals as challenging opportunities to improve themselves as well as the groups that they lead?

Culturally, Dow continually challenged the status quo, rather than accepting it. It empowered employees to engage in the change process, challenging them to make changes, and then rewarding those who did. Dow implemented a number of changes to encourage employee participation and to identify improvement opportunities. Graduate level students may find it helpful to compare the Dow EH&S pre-1995 culture with

the company's post-2005 culture. A discussion of how this cultural shift in EH&S also affects other aspects of business operations would be especially meaningful to MBA students.

Reorganization

From 1995 to 2005, Dow underwent a major change in how it managed risk and resources. This involved a change in priorities and organizational structure. Dow saw improvements in productivity, quality, and safety. It is important to note that productivity is affected by efficiency, resource utilization, waste reduction, and loss prevention.

Organizational changes at Dow were needed to increase staff efficiency. A reallocation of responsibilities enhanced the efficiency of the EH&S function and presented opportunities for less skilled personnel to engage in the EH&S processes. This broadened the network of EH&S champions while improving the efficiency and effectiveness of the skilled technical professionals. Fortunately, Dow's senior management maintained its course of EH&S improvement long enough to enable the structural and personnel changes needed to achieve its 2005 EH&S objectives.

Discussion of reorganization will probably be limited for undergraduate students to explaining the concepts of operational efficiency for technical professionals and why organizations change. However, graduate students may be encouraged to map out ideal organization structures, draft business strategies, and then discuss those strategies.

Choosing the Future Direction

The case study presents three options for a future direction facing Dow:

1. Renew the 2005 goals to reflect new metrics
2. Create an entirely new set of goals
3. Maintain the 2005 goals and sustain the gains (although not an option considered by Dow)

In Option 1, Dow would renew and expand the 2005 goals by, for example, committing to reduce another 75% of chemical emissions by 2015. This option would build on Dow's previous successes, so the company would not have to invest as much capital up front. After reflecting on the \$5 billion ROI from the 2005 goals, Washington told Liveris that he thought the next 10 years might yield similar results. It would also allow Dow to continue working toward an ideal metric of zero: zero injuries, zero spills, zero incidents. However, Dow may not be able to maintain its momentum. After decreasing injuries by 84%, perhaps the company will have to set a lower goal, like decreasing injuries by 75% or 50%. Though this might be even more challenging than reducing the first 84%, there is a risk that stakeholders and the public would perceive this change as lowering standards. Also, it is not clear how much ROI the company would gain as part of the next 10-year plan.

In Option 2, Dow could address a completely new set of challenges. This would entail going outside its normal focus area of simply reducing its EH&S metrics, to starting new product lines, engineering new processes, or getting involved in communities in ways that it never had before. In effect, Dow would be focused on making a positive impact, rather than just on internal metrics improvement. However, Dow would be pushing the boundaries of what both internal and external stakeholders think is possible. This might be appealing to the company's environmental advisory council, but it would be a high risk for Dow, especially if it failed and threatened the reputation that Dow had so carefully cultivated over the past 10 years. The company would have to invest in research in order to create appropriate solutions and stay profitable. Also, soft goals such as these could be a tough sell for the numbers driven board of directors.

Although not an option considered by Dow, in Option 3, Dow would likely experience challenges to avoid complacency and maintain a high level of awareness. Developing excellence in acquisitions and benchmarking with other companies may be appropriate objectives aimed at continuous improvement. Students should be encouraged to discuss these options and to identify the pros and cons of each. They should also be encouraged to identify the underlying implications of each option.

Assigned Case Questions

1. Why would companies engage in EH&S and sustainability? Ethical motives? Compliance? Why should organizations put EH&S ahead of profits?
2. Do corporations have a responsibility to the world at large, or do they only have a responsibility to their shareholders? Why?

Suggested Teaching Plan

- Case introduction (10 minutes)
 - What is EH&S and what role does it traditionally play in companies?
 - Summarize the Dow situation in 1995 and the status in 2005.
 - Highlight a few of the changes at Dow that achieved these results.
 - Present goals and restate the learning objectives.
 - Have students identify how Dow should move forward.
- Discussion of Questions for Class Preparation in the order given (30 minutes for undergraduates, 40 minutes for graduates)
 - Prompt students to provide some of the insights in the Case Analysis.
 - For undergraduates, emphasis may be placed on metrics and goal setting.
 - For graduate students, emphasis may be placed on business strategy, challenges associated with integrating EH&S, culture change, and reorganization.
- Discussion of future direction (10 minutes for undergraduates, 20 minutes for graduates)
 - Allow students to discuss the pros and cons.
 - Take a vote on what direction should be taken.
- Play video clip of Dow official explaining what decision was made and why (10 minutes)

Finally, the instructor can hand out the “Epilogue” and give students a few moments to read and digest the material. This update provides students with the results of the company’s 2005 plan and progress made on its 2015 EH&S plan, as well as the impacts of Dow’s EH&S goals on the company’s bottom line.



Dow (NYSE: DOW) combines the power of science and technology to passionately innovate what is essential to human progress. The Company connects chemistry and innovation with the principles of sustainability to help address many of the world's most challenging problems such as the need for clean water, renewable energy generation and conservation, and increasing agricultural productivity. Dow's diversified industry-leading portfolio of specialty chemical, advanced materials, agrosociences and plastics businesses delivers a broad range of technology-based products and solutions to customers in approximately 160 countries and in high growth sectors such as electronics, water, energy, coatings and agriculture. In 2012, Dow had annual sales of \$57 billion and employed approximately 54,000 people worldwide. The Company's more than 5,000 products are manufactured at 188 sites in 36 countries across the globe. References to "Dow" or the "Company" mean The Dow Chemical Company and its consolidated subsidiaries unless otherwise expressly noted. More information about Dow can be found at www.dow.com.



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