



Assessment

A comprehensive evaluation of key technology topics

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SUBJECT: Environmental Sustainability Strategies and Initiatives at Ford

PURPOSE: Background and context in support of policy and other decisions

- SUMMARY:**
- Ford relies on public relations to establish perception of leadership in environmental sustainability:
 - First to commit to 25% improvements in SUV fuel economy
 - Widely publicized environmentally-based plant renovation program at Rouge complex
 - Ford emphasizes their environmental performance in manufacturing, tailpipe emissions, recycled material content, and alternative-fuel vehicles:
 - First automotive OEM to certify all facilities to ISO14001 and also the first to require the same of suppliers
 - Early compliance to US and European tailpipe emissions standards
 - Incorporating Life Cycle based Design-for-Environment in vehicle development

- IMPLICATIONS:**
- Ford strategy is to cultivate image of environmental stewardship in an attempt to influence both consumers and regulators.
 - Positive customer perception of Ford's environmental performance is perceived by Ford as a competitive advantage in vehicle purchase decisions.

SOURCE ASSESSMENT: Company annual environmental reports, press releases, corporate web sites, conference presentations, third party evaluations, and personal contacts

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Introduction

This is the first in a series of reports looking at OEM environmental sustainability strategies and initiatives. A comprehensive synthesis of all OEMs is to follow this series.

This report provides a life cycle perspective on the environmental activities underway at Ford. The life cycle perspective, shown as Figure 1, includes environmental issues associated with acquiring raw materials, manufacturing, using, and recycling/recovering/disposal of end-of-life vehicles. In the automotive industry, this roughly translates to issues associated with supply chain management, component manufacturing, vehicle assembly, fuel economy and emissions, and vehicle recyclability. Any one or all of these areas can be impacted by design decisions such as material choice, e.g. aluminum, steel, or plastic, or the decision to use virgin or recycled material. Strategic decisions such as choice of fuel and/or powertrain - e.g. diesel or gasoline, conventional or hybrid - also critically impact a number of life cycle environmental issues.

Overall, environmental issues are only a subset of a broader range of concerns comprising the concept of sustainability. Sustainability is generally defined as the ability to meet the needs of the present without compromising the ability to meet future needs. Sustainable mobility has three essential components: economic, social, and environmental. For an OEM to be economically viable in an ongoing, sustainable fashion, it must succeed in all three areas. An OEM must: 1) provide economical transportation products to a market with the financial means and desire to purchase them, 2) provide products that meet the needs of the market and be consistent with an available and sustainable transportation infrastructure, and 3) meet or exceed the needs/desires of the market for environmental performance.

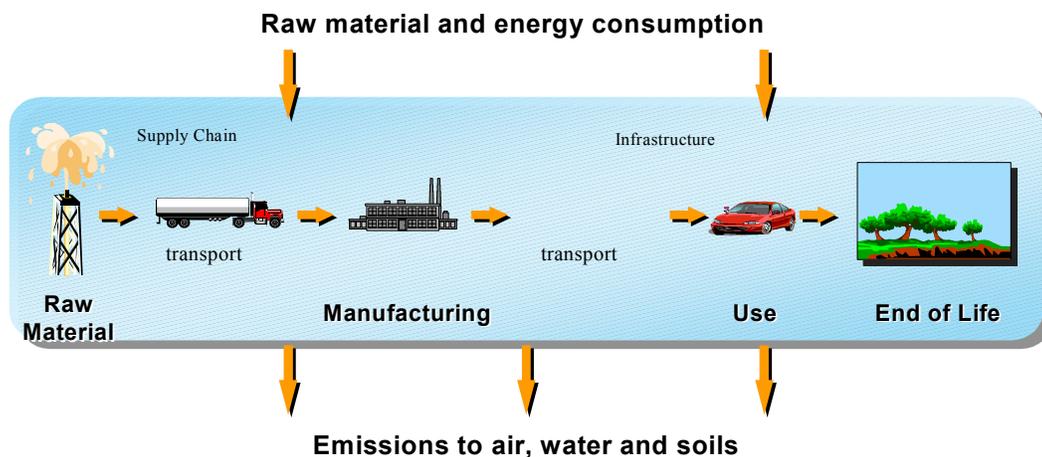


Figure 1. The Environmental Lifecycle

Corporate policies and activities directed toward achieving sustainable mobility are influenced by having dialog with, and acknowledging and addressing the concerns of, a number of stakeholders including:

- Government bodies
- Non-government organizations
- Shareholders
- Customers
- Academia

Hence, company performance in sustainable transportation covers a broad range of activities. However, the activities that will lead to sustainable mobility are still largely undefined. Consequently, success in this area is partly a matter of perception. However, in the area of environmental performance, there are more clearly defined metrics for assessment. In this report, the activities underway at Ford for achieving sustainability are covered in the following general categories:

- Corporate Policy
- Design, Stakeholder, and Strategic Initiatives
- Supply Chain Initiatives
- Facilities/Manufacturing
- Fuel Economy/Emissions
- Recycling/Recycled Content
- Socio-economic/Infrastructure Initiatives
- Developments in Alternative Propulsion

Following a review of activities in each of these areas, Ford's strengths will be reviewed in the Summary section.

The following acronyms will be used in this report:

CERES – Coalition for Environmentally Responsible Economics

DFE – Design for the Environment

ELV – End of Life Vehicles

EMS – Environmental Management System

GHG – Greenhouse Gas

GRI – Global Reporting Initiative

LCA – Life Cycle Assessment

NGO – Non-Government Organizations

Corporate Policy

Ford has made a commitment to corporate citizenship, stated as follows: Our commitment to corporate citizenship requires us to:

- Consult with a broad set of stakeholders to get their views on key issues.
- Consider the economic, environmental and social impacts of our actions, in addition to the financial implications.

- Align our planned course of action with our Company's values.

Ford's annual report goes on to say that "after decisions are made, they must measure whether they created value for both the Company and society."

Design, Stakeholder, and Strategic Initiatives

This is perhaps Ford's strongest area. They have done well with engaging stakeholders on environmental issues and use public relations to advantage in this area.

Bill Ford has been quoted as saying "I personally believe that sustainability is the most important issue facing the automotive industry and industry in general....For automobile manufacturers, sustainability is largely an environmental issue."

Ostensibly, Ford's goal is to be perceived as the leader on environmental issues. They strive for this by integrating their actions with corporate communications, providing press releases for every environmental action the corporation takes. To accomplish this, Ford has advertised environmental achievements across the vehicle life cycle:

- Sweeping environmental renovations to their Rouge manufacturing facility.
- First to certify their manufacturing facilities to ISO14001.
- First to require their tier 1 suppliers to be ISO14001 certified.
- Early attainment of emission standards in both Europe and the US.
- Commitment to a 25% fuel economy improvement of their US SUV fleet.
- Advertising the extensive use of recycled materials in their products.
- Claiming that 50% of Ford's entire research budget is dedicated to environment and safety.

Ford has a very active environmental grant program (discussed further in the socio-economic/infrastructure section later in this report), which is also incorporated into their public relations efforts.

Ford also has made substantial investments in CO₂/climate change issues by:

- Playing a leading role in establishing the voluntary industry agreement that will reduce CO₂ emissions by 25% in Europe (relative to 1995) by 2008.
- Having established a climate change inventory and baseline for the company.
- Benchmarking the performance of leading companies regarding their practices on climate change.
- Being the first OEM to provide fuel economy and CO₂ emissions labels as required by the EU. (Ford went further than required by also providing tailpipe emissions, recyclability, and plant EMS ratings).
- Being the first automotive manufacturer to submit a voluntary greenhouse gas reduction plan under the Australian government's Greenhouse Challenge.
- Using renewable energy sources.
- Committing to fuel economy improvements in the US SUV fleet.

- Working with suppliers to reduce GHG emissions throughout the value chain.
- Funding climate change research at MIT, Columbia, and UM for several years.
- Working with BP and Princeton University on carbon mitigation, supporting the effort with \$5M over 5 years.

Ford is also very active in cooperative programs, working with government and NGOs in a number of diverse areas:

- Ford is in a cooperative program with the World Bank to develop action plans to promote cleaner air in Southeast Asia cities.
- They are also in a partnership with the Thailand National Science and Technology Development Administration to develop systems and technical capabilities to produce bio-ethanol fuel. This work will include a full life cycle assessment of the production and use of bio-ethanol and its by-products.
- Ford has also committed to engaging local stakeholders in India to identify environmental issues of concern to the region.
- Ford has joined CERES.
- Ford has joined the GRI and is now issuing Corporate Citizenship reports using GRI's Sustainability Reporting Guidelines.
- Ford has joined the Recycled Paper Coalition and has committed to purchasing paper with at least 30% postconsumer content.

Ford of Europe is also a leader in employing LCA, claiming to have conducted “hundreds” of LCAs. However, it is not known whether LCA teams have been integrated with vehicle development programs, as is done at several other OEMs (such as Daimler). However, at Volvo, there is a strong emphasis on LCA in the vehicle development program. They were the first, and are still the only automotive OEM, that issues a comprehensive environmental product declaration.

Supply Chain Initiatives

This is an area of strength for Ford, but again perhaps more so in terms of public relations than in fact. Their use of recycled materials is significant, however. Significant examples of Ford supply chain efforts include:

- Being the first automotive OEM to require ISO14001 certification by its tier 1 suppliers.
- Working with suppliers to incorporate recycled and renewable materials in their products, now claiming to have used 140,000,000 pounds of recycled plastics in 800 production parts and 27,000 tons of renewable materials in European vehicles.
- Volvo audits its suppliers on a number of criteria, one being environmental performance.
- Developed E-RAT, the European Recycling Action Team, to generate increased demand for recycled material. The team works with suppliers to help influence material choices and part designs. ERAT was recognized with a UK National Recycling Award. A similar team exists in the US.

- Worked with GE Plastics and American Commodities to recycle more than a ton per day of Xenoy bumpers into lamp housings for more than 11 vehicle lines. This earned Ford a Society of Plastics Engineers award.
- Is using post-consumer nylon resin from used carpeting to annually produce 260,000 Windstar fan modules. Ford earned a Society of Plastics Engineers award for this.
- Worked with Dupont to produce air cleaner assemblies using 25% recycled nylon resin from reclaimed industrial carpeting. Ford claims to use 27 million square feet of recycled carpets annually in its vehicles.
- Worked with National Rubber to develop uses for recycled tire rubber, including components such as air deflectors, baffles, and splash shields. Six million pounds of rubber from 360,000 tires are used annually.
- Ford has worked with suppliers to develop a tire that contains 5% recycled content and is using this tire on some product lines.
- Ford has developed DFE classes and offers them to all Ford and Ford supplier engineers.

Facilities/Manufacturing Initiatives

Ford has invested heavily in facility renovations with environmental considerations a major area of emphasis:

- Ford was the first OEM to certify all of its manufacturing facilities to ISO14001.
- Ford's River Rouge plant restoration is the most sweeping environmentally-based restoration of a manufacturing facility ever undertaken in the automotive industry.
- Ford has worked with the Wildlife Habitat Council since 1990 to implement plans to enhance wildlife habitats at Ford properties. Thirty such projects are currently ongoing.
- Ford claims to have reduced global annual water consumption by 2.6 billion gallons.
- The Sheldon Road plant in Michigan is the only automotive plant in the world where every part produced is made of recycled material.
- Utilized an environmental sustainability assessment as part of the redevelopment of the Halewood Jaguar facility.
- Worked with a community liaison committee to develop an Environmental Improvement Plan for their Broadmeadows plant in Australia.

Fuel Economy/Emissions

In terms of fuel economy, Ford has made more of their public relations efforts than they have accomplished in fact. They have accomplished more in terms of emissions reductions.

Examples of their commitments and actions include:

- Voluntarily upgrading SUVs and F-series pickups to meet lowered US emission standards 1 to 5 years ahead of schedule.
- More than 25% of Ford's vehicles meet the EU Stage IV emission standards scheduled for 2005.
- Announcing that they intend to increase the fuel economy of their US SUV fleet by 25% by 2005.

- Committing in 1999 to a 5% fuel economy improvement with each new vehicle replacement program.
- Establishing a rare-earth oxide catalyst program with government and academic institutions in China.
- It has been reported that Ford intends to purchase a share of privately held Catalytic Solutions, Inc. Catalytic Solutions claims they have a catalyst system that uses fewer precious metals and can reduce the cost of catalytic converters by “hundreds of dollars”.

Recycling/Recycled and Renewable Content

This is an area of strength within Ford, and they occasionally emphasize this in advertising and publicity releases. Ford, like all European OEMs must meet the EU ELV standards of 85% recyclability and 95% recoverability by 2015. This is a technical challenge for all OEMs, requiring them to develop ELV strategies to meet these goals. Examples of Ford accomplishments and actions include:

- Increasing headcount at their Aachen research facilities by 50%, largely to address recycling issues.
- Used 140 million pounds of recycled plastic in 800 production parts
- Used 54 million pounds of renewable materials in European vehicles.
- Working with Stermat, LaserLabor Adlershof, DCX, and BMW to develop a plastics separation technology to attain the EU ELV recyclability/recoverability standard.
- Developing components that utilize natural renewable materials.

Socio-Economic/Infrastructure Initiatives

Ford has a very active environmental and social grant program, much of which is focused on emerging markets. These grants appear to serve the dual purpose of good corporate public relations while also addressing very specific environmental concerns in selected countries. The countries are predominantly those that are economically under developed and might represent high growth potential. Grants have been announced to recipient organizations in:

- Yugoslavia (\$7k) - for various causes.
- Croatia (\$10k) - preserving environment and culture
- Slovenia (\$15k) - for preserving culture.
- Rumania (\$10k) - for protecting the Carpathian bats.
- the Ukraine (\$10k) - for protecting the Black Sea and revival of the Crimean Forest.
- Bulgaria (\$10k) - for protection of the Crowned Eagle.
- Chile (\$30k) - for conservation and preservation of the environment and cultural heritage.
- Puerto Rico (\$40k) - for various causes.
- Singapore (\$64k) - for various environmental projects.
- The Gulf Cooperative Council Countries (\$90k).
- The Philippines (\$53k) - for environmental protection, conservation and preservation of historical and cultural heritage.
- Taiwan (\$43k) - for various environmental projects to be determined.

- Ford has also provided a grant to Harvard to help India to effectively plan their transportation infrastructure.

They are also in a partnership with the Thai National Science and Technology Development Association to develop capability for bio-ethanol fuel production.

In Germany, Ford is providing eco-training classes that teach drivers about the relationship between driving behavior and emissions and fuel consumption.

Ford is also conducting research on telematics-based traffic congestion solutions. They are also conducting a pilot program in Cologne, Germany to alleviate severe parking problems by providing current information on available parking locations.

Developments in Alternative Fuel/Propulsion

Ford has a very strong program of developing alternative fuel vehicles, with a lot of emphasis on flexible-fuel vehicles and dedicated propane and LPG vehicles. Ford:

- Will provide up to 50 fuel-cell powered Focus's as a partner in the California Fuel Cell Partnership.
- Recently confirmed an intent to introduce a hybrid version of the Escape in 2003.
- Announced an intent to launch a fuel cell powered Focus in 2004.
- Has a variety of flexible-fuel vehicles – propane, ethanol, natural gas, and electricity.
- Is working with the DOE and a number of companies to develop propane and natural gas refueling stations in the west and Midwest for customers of their flexible-fuel vehicles.
- Developed and is actively marketing the Think! brand of electric powered vehicles and electric bikes.
- Is the only manufacturer in Australia to produce an LPG powered vehicle.

Summary

Ford is the leader in using public relations to enhance their image of the environmentally friendly car company. They have been very proactive in working with NGOs to identify areas of public concern. They have a very active grant program, donating funds to a number of environmental and social causes in many countries. Ford apparently believes this gives them, or will ultimately give them, market advantage.

Ford has strengths in a number of areas including manufacturing, tailpipe emissions, alternative-fuel vehicles, and Life Cycle based design. Ford is also very strong in research and development programs in the Asian Pacific region.

Ford was the first automotive OEM to certify all of their manufacturing facilities to the ISO14001 environmental standard. They were also first in requiring that their tier 1 suppliers be

certified to the standard as well. They have undertaken a number of innovative plant renovations, including the well-publicized Rouge Plant renovation.

Ford has been the most rapid domestic automotive OEM to meet the ULEV/SULEV emission standards in California. They have also made significant commitments to fuel economy improvements, but it is less clear they will fulfill such commitments on the time scale suggested.

A Ford strength is the extensive use of recycled materials in their vehicles. They are also actively pursuing the development of components that utilize natural renewable materials.

Ford has developed a wide array of vehicles designed to run on propane, LPG, and variable blends of ethanol and gasoline. They also have flex-fuel vehicles designed to run on various fuels and have an active program underway to develop fuel cell vehicles.