# Executive Summary

U.S. automakers are falling behind their foreign competitors in the use of sustainable plastics. The industry leader, Toyota, has set aggressive goals for increasing its use of recyclable and biodegradable plastics, and is also reporting publicly on its progress. While U.S. automakers are making progress in some areas, none are matching Toyota's goals, research and development investments, or actual use of sustainable plastics.

Plastics are a growing material component of vehicles. Plastics now represent 7.5% of a vehicle's weight, up from 0.6% in 1960. While 7.5% of a vehicle's weight may seem small, it represents 258 pounds of material per vehicle or 4.3 billion pounds per year in the United States alone. That is 4.3 billion pounds of plastics disposed primarily in landfills and incinerators. With the use of plastics in automobiles and auto production on the rise globally, plastic waste from discarded autos will continue to flood into landfills and incinerators across the earth.

The manufacture of plastics poses another set of environmental challenges. Made from non-renewable fossil fuels and toxic chemicals, the plastic products of today are both unsustainable and the source of toxic pollutants. For example, polyvinyl chloride (PVC), one of the leading plastics used in vehicles is made from the carcinogen, vinyl chloride monomer (see text box on page 3).

Plastics do not need to be manufactured from non-renewable fossil fuels and toxic chemicals. Back in the 1930s, Henry Ford produced an entire car body made from soybean-based plastics. Today, Toyota is developing plastics made from sugar cane and corn for use in its vehicles.

To help consumers and other stakeholders evaluate the progress of automakers towards sustainable plastics, this report grades the top six auto companies in the U.S. on their policies, goals, and actions. How do corporate-wide environmental goals address plastics use? What are their goals for sustainable plastics? How are they measuring progress toward meeting their goals? And how far along the path of environmentally sustainable plastics have they gone?

For this report, we define environmentally sustainable plastics as:

- having no hazardous chemicals associated with the life cycle of the material,
- being capable of either a) closed-loop recycling (recycled into the same product) or b) degrading into healthy nutrients for the soil, and
- being manufactured from renewable raw materials and energy (without the use of genetically modified organisms–GMOs).

This report evaluated and graded the six largest automakers selling into the American market: Daimler Chrysler, Ford, General Motors (GM), Honda, Nissan, and Toyota (see Table 1ES). Together these six automakers account for 87% of vehicle sales in the United States.

**Table 1ES. How They Fared: Sustainable Plastics Grade Point Average (GPA) & Grade**

| Automaker | GPA (Grades) for all Topics |
|---|---|
| Toyota | 2.1 (C) |
| Honda | 1.3 (D+) |
| DaimlerChrysler | 1.2 (D+) |
| Ford | 1.2 (D+) |
| Nissan | 1.1 (D) |
| GM | 1.0 (D) |

We graded the automakers based upon:

- their vision for sustainable materials,
- the measurable goals they set to achieve sustainable plastics, and
- the actions they have taken to transform their use of plastics.

Toyota is the clear sustainable plastics leader. Its Sustainable Plastics Grade Point Average (GPA) of 2.1 or a "C" is almost a grade higher than its closest competitor, Honda, with a GPA of 1.3 or a "D-plus" (see Table 1ES).

Toyota is the leader because it has:

- developed its own innovative renewable-based plastic and closed-loop recyclable plastics,
- set measurable goals at the global level, and
- taken action, including striving to eliminate its use of PVC.

GM lags the farthest behind with the lowest Sustainable Plastics GPA of 1.0 — which is barely passing with a "D." GM had little to highlight in terms of measurable goals and activities toward sustainable plastics. Nissan, with its Sustainable Plastics GPA of 1.1, and DaimlerChrysler and Ford, with their Sustainable Plastics GPA's of 1.2, however, are only a shade better than GM.

Honda, with a Sustainable Plastics GPA of 1.3, is still struggling, but is slightly ahead of the other companies. The relative strength of Honda's reporting on activities toward sustainable plastics moved it ahead of the others.

While automakers can improve their grades by doing a better job of reporting their activities, such as reporting their goal of reducing PVC use, the level of commitment to taking action to use sustainable plastics is weak among five of the six automakers evaluated here, Toyota being the exception. Assuming that the data provided in their environmental reports and on their webpages are good indicators of the automakers sustainable plastics goals and activities, all of them have a lot of work to do.

Given that the concept of "greening" of plastics is still in its infancy, it should come as little surprise that the overall grade point averages for the automakers on "sustainable plastics" are barely above failing. Certainly disappointing, however, is that the American automakers are at the bottom of the class in terms of sustainable plastics performance.

**Many petrochemical-based plastics use and release toxic chemicals at several stages of their life cycle.** For example, PVC used in vehicle components has the following impacts:

**Production**

- Input of toxic chemicals and human carcinogens including ethylene dichloride, vinyl chloride monomer, lead, phthalates and organotins
- Release of toxic chemicals including dioxin, furans, hexachlorobenzene, and PCBs

**Vehicle use**

- Release of phthalates resulting in occupant exposure and fogging

**End of Life**

- Release of dioxins, furans and hydrochloric acid during vehicle shredding and incineration
- Landfill leachate of heavy metals and phthalates from auto shredder reside

### *American Consumers Suffer from Environmental Double Standards*

In reporting on progress toward sustainable plastics, the Japanese firms of Toyota and Honda are clearly ahead of Ford, GM, and DaimlerChrysler. With the U.S. government lagging behind Japan and the European Union in terms of recycling requirements and elimination of toxic chemicals, the North American automakers are following suit. We see this distinction emerging within the automakers themselves. For example, GM's leading activities on sustainable plastics are happening within its European subsidiary, Opel. And GM even acknowledges the difference: "Over the last decade, for example, our European subsidiaries have been progressively increasing the content of recycled plastics in their vehicles. During 2001, more than 30,000 tons of recycled [plastic] materials were incorporated in new Vauxhall and Opel vehicles, six times more than in 1991" (GM, 2002, p.108).

The lack of global environmental commitments among all the automakers reflects the environmental double standards that are often imposed, especially with products, on nations without strong consumer and environmental laws.

The lack of global environmental commitments among the automakers reflects the environmental double standards that are imposed, especially with products, on nations without strong consumer and environmental laws. In the past, these double standards have typically emerged between developed and developing nations. This report card reveals that the U.S. is increasingly being treated as a developing nation. As American environmental laws fall behind those of Japan and Europe, corporations are slower to adopt more environmentally advanced products and materials in the U.S.

We predict that the activities toward sustainable plastics of all automakers selling in the U.S. will continue to lag behind activities in Japan and the European Union.

### *Sustainable Plastics: Examples of Leadership from the Auto Sector*

While progress toward sustainable plastics is slow, and progress in the U.S. is slower than in Europe and Japan, there are positive examples of change in the industry. Collectively, the best visions, goals, and actions among the six automakers represent a clear first step toward materials that sustain human health and natural ecosystems and away from plastics with negative environmental impacts.

The combination of Toyota's vision of recyclability and Ford's vision of sustainable materials creates a clear path toward sustainable plastics. Toyota's vision is simple and clear: use recycled material and renewable resources, reuse used parts, and reduce toxic substances of environmental concern such as lead (Toyota, 2003, p.36). Ford's vision is grounded in ecology: sustainable materials never become waste, but instead become "nutrients that either feed healthy soil or the manufacturing processes without moving down the value chain" (Ford, 2002, p.72).

The collective goals of the automakers encompass all of the elements of our definition of sustainable plastics, including:

- using recycled content or renewable resources in plastic products (Toyota),
- reducing PVC use (Toyota),
- developing and using materials that are either technical nutrients (can be closed-loop recycled) or biological nutrients (can be composted into matter healthy for the soil) (Ford), and
- using non-toxic materials (GM).

Significant activities by automakers include:

- using polymers made from bio-based (i.e., renewable) materials (Toyota, DaimlerChrysler, and Ford),
- using recyclable plastics that consist of polyolefins and not PVC (Honda, Nissan, Toyota, and Opel/GM),
- using plastic products with recycled content (DaimlerChrysler, Honda, Toyota, GM, and Nissan), and
- reducing PVC use (Toyota).

But no one company is doing enough.

If these six automakers moved quickly to adopt the leading goals and to implement the leading activities over the next three years, the auto sector would make significant strides toward sustainable plastics. But they're not there yet.

# Recommendations for Automakers

The best examples from the auto sector show that automakers have the capacity to design for environmentally sound plastics. Except for Toyota, however, progress on managing the environmental sustainability of plastics appears to be happening in a piecemeal fashion.

If the automakers are to make significant progress toward safer, cleaner plastics they must:

### 1. Commit to achieving sustainable plastics at the global level:

The automakers are failing to commit to the same level of sustainable plastics performance in the U.S. as in Japan and Europe. This is especially true of the American-based automakers, whose reporting of progress toward sustainable plastics is not on par with the Japanese firms. Automakers need to commit to achieving sustainable plastics at the global level, not only in nations where change is legislated.

### 2. Set measurable goals and report on progress globally:

If progress is to be made, automakers must set goals for which they can be held accountable. Progress must be reported on a regional or national basis, as well as globally, and include quantitative as well as qualitative data on progress toward specific goals and objectives, including:

- eliminating the use of PVC plastic,
- reducing toxicity of plastics across their life cycle,
- using renewable resources in making or substituting for plastics,
- reusing of plastic products,
- designing plastic products for recyclability,
- using post-consumer recycled plastic, and
- increasing recycling rates for plastic in end-of-life vehicles.

**3. Transition away from incineration as a disposal option:**
Incineration, with or without energy recovery, should be avoided as a method for achieving end-of-life vehicle recovery goals because it:

- Creates pollution with harmful health effects
- Discourages recycling, and
- Eliminates the life cycle environmental benefits of recycling.

In reporting on end-of-life recycling and recovery efforts, automakers must stop mischaracterizing incineration as materials recycling or reuse when reporting on end-of-life recycling and recovery efforts. Reporting should be consistent with the EU Directive on End-of Life Vehicles, which explicitly defines reuse and recycling to exclude energy recovery.

**4. Provide relevant sustainable plastics information on the web**.
Given the commitments of all six automakers included in this report to provide environmental data to customers, shareholders, and the concerned public, the automakers need to do a much better job of providing relevant and easy-to-understand data on their webpages.

Environmental reports do not need to be, nor should they be, vast compendia of environmental data. However, relevant materials and data should be archived and easily located on corporate webpages. Similarly, the environmental reports for all of the corporate brands and subsidiaries should be available on one webpage.

# Recommended Goals for Sustainable Plastics in the Auto Sector

Achieving sustainable plastics will also entail setting generational goals. We recommend that automakers adopt the following quantitative goals for sustainable plastics:

**By 2009, eliminate the use of PVC plastic in vehicles sold globally.**

**By 2010, design 95% of all plastic products to be either reusable or recyclable.**

**By 2015, use 50% reused plastic products, recycled plastics, or plastics made from renewable resources at the global level.**

**By 2020, use only plastics that are made without hazardous chemicals, are capable of being closed-loop recycled and are manufactured from renewable raw materials.**