Creating a More Sustainable Airbag

4 ways to reduce the environmental impact of airbag fabric

OPEN ROAD™

fabric for airbags

Automaker Sustainability Initiatives

Sustainability and the Automotive Industry

62%

of automotive firms have a comprehensive sustainability strategy.

(Source: Capgemini report)

Sustainability is a critical strategic initiative for the automotive industry. A majority (62%) of automotive firms report that they have a "comprehensive sustainability strategy with well-defined goals and target timelines."[1]

The industry's commitment to sustainability exists across the globe, while priorities vary. In North America, the current focus is reducing tailpipe CO_2 emissions. Europe and Japan seem to be moving to zero lifecycle CO_2 equivalent emissions. And China is on a fast track to electrification, with a focus on weight savings. As the industry takes significant steps to reduce vehicle emissions, it is also placing recycling and the reduction of energy use and materials on the priority list.

Every major auto company has a sustainability initiative. Notable examples include:

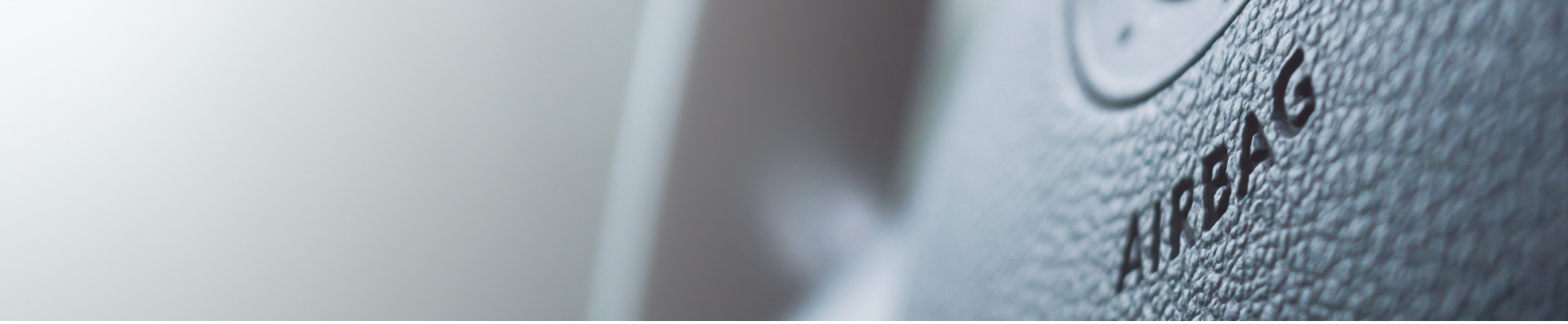
Volkswagen's TOGETHER 2025+ strategy[2] aims to make the company carbon neutral by 2050 and focus on electrification and emissions reduction in the supply chain.

The goals of Toyota's Environmental Challenge 2050[3] include achieving zero lifecycle CO_2 emissions, minimal water use and establishment of recycling-based systems.

Ford's climate change goal[4] is to be carbon neutral by 2050, with interim steps including investing in electric vehicles and incorporating recycled and renewable materials in its vehicles.

Volvo's ambitious Omtanke[5] sustainability program is committed to reducing per-vehicle CO_2 emissions by 40% by 2025 and to aim for carbon neutrality by 2050, while also setting targets for recycled plastics in vehicles.

[1] https://www.capgemini.com/us-en/sustainability-a-strategic-priority-for-the-automotive-industry/
[2] https://www.volkswagenag.com/en/sustainability/environment/strategy-together-2025.html
[3] https://global.toyota/en/sustainability/esg/challenge2050/
[4] https://media.ford.com/content/fordmedia/fna/us/en/news/2020/06/24/ford-expands-climate-change-goals.html
[5] https://group.volvocars.com/sustainability



The Industry Demands a More Sustainable Airbag

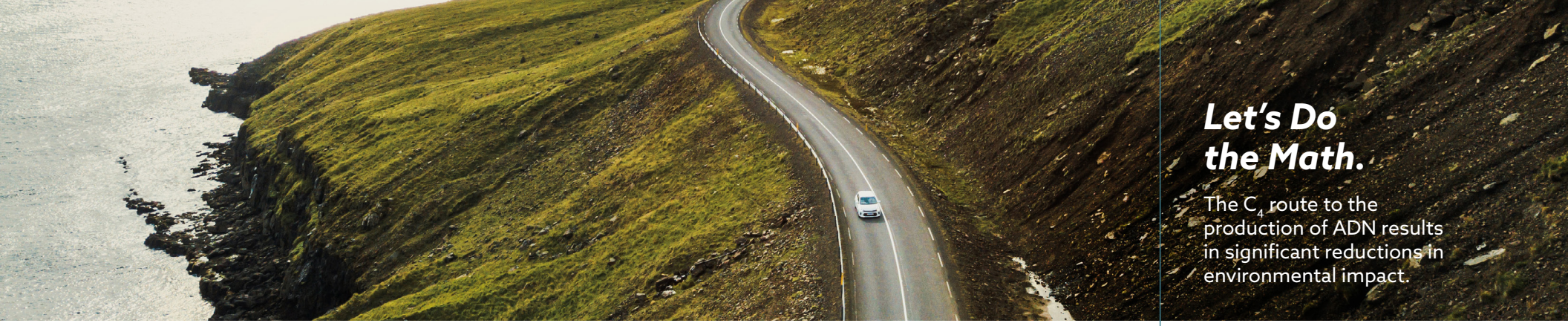
Airbags, the passive safety systems designed to protect drivers and passengers during a collision, continue to be an essential sector of the automotive industry. Over the years, the number of airbags installed per vehicle has increased as automakers take steps to further improve occupant safety. Today, six airbags is standard equipment in most passenger cars. And they're working. According to the National Highway Traffic Safety Administration (NHTSA), frontal airbags saved more than 50,000 lives in the United States between 1987 and 2017.[6]

The fabric used in the production of airbags must be able to maintain its integrity and ability to cushion against impacts during rapid inflation. Over the years, manufacturers and their suppliers have explored options for improving the performance of airbag cushions and fabrics. Today, faced with greater concerns about the environmental impact of materials used in the supply chain, airbag suppliers are placing new focus on reducing the environmental impact of airbag fabric.

Introducing a new route to a more sustainable airbag fabric.

INVISTA's new process has been launched for the creation of a more energy-efficient airbag fabric. We'll explore the main steps in that process — and their potential environmental benefits.

[6] https://www.nhtsa.gov/equipment/air-bags



Let's Do the Math.

The C_4 route to the production of ADN results in significant reductions in environmental impact.

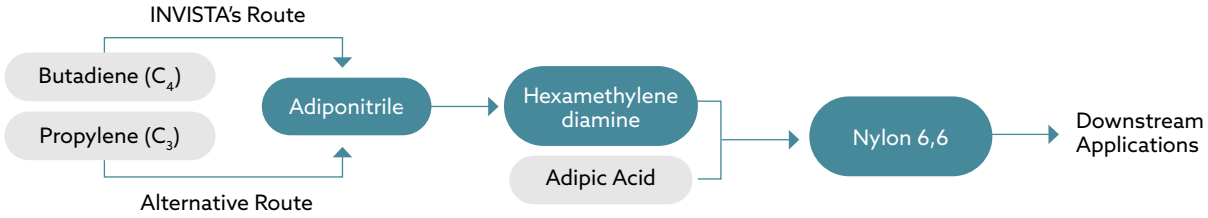
Step 1:

Use an energy-efficient polymer production process.

Airbags have typically been manufactured using a compact woven fabric composed of nylon 6,6 filaments. Adiponitrile (ADN) is one of the main ingredients in the manufacture of nylon 6,6 polymer.

The most energy-efficient route to the production of ADN is one that employs butadiene (C_4-based). This has proven to be significantly more energy efficient and cost effective than a route that employs propylene (C_3-based) and results in lower CO_2 equivalent emissions.

Route to Nylon 6,6



Reduces primary energy demand (PED) by

~50%

Cuts CO_2 equivalent emissions by

~35%

on a US-equivalent basis

Consider This:

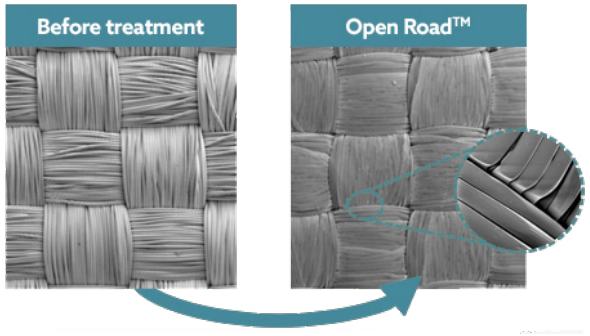
Compared with 12kg of nylon 6,6 in a vehicle, the process has the potential to reduce CO_2 equivalent emissions by 16kt per 1 million vehicles annually.

(Or 1.3kt CO_2 equivalent savings per 1 kg of nylon 6,6 x 12kg nylon 6,6 per vehicle.)

Step 2:

Eliminate coating and simplify fabric production.

For decades, industry focus has been on reducing the size of the airbag module, while also continuing to provide reliable protection against collisions. Until recently, one of the primary routes chosen to assure permanent low permeability has been the use of silicone coatings.



But what if a fabric could be produced that provides low air permeability without the need for coating?

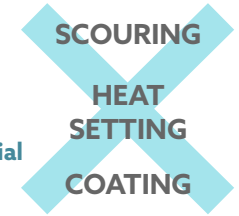
A process is now available that significantly reduces fabric production complexity — while creating an uncoated fabric with low permeability *and* improved uniformity compared with other uncoated fabrics. And, through this patented process, the thickness of the fabric is reduced, thus adding design flexibility in vehicle interiors.

A new process reduces the complexity of fabric production.

A new, innovative fabric production process eliminates the scouring, heat setting and coating steps in the traditional process — providing significant energy savings.

A PATENTED PROCESS
achieves precise air permeability

- No need to wash and dry prior to coating
- Reduces water usage
- Eliminates coating process
- Eliminates embedded energy in the coating material
- Reduces energy usage



By eliminating the need for coating, the new process has the potential to reduce volatile organic compounds (VOCs) and to enhance the recyclability of the material — helping auto manufacturers achieve their sustainability and cost goals.

Step 3:

Follow a manufacturing protocol with the potential to reduce VOC emissions.

Car buyers love that "new car smell." That familiar odor is actually caused by solvents used in the coatings found on many airbags and other components in vehicle interiors. Those solvents are classified as volatile organic compounds (VOCs) — or carbon-based compounds.

Although regulations regarding VOCs vary in different regions and, in some cases, are in the very early stages of consideration, standards governing permissible concentration levels of VOCs in vehicle interiors are expected to tighten. For example, China, the largest automobile market in the world, is considering stricter standards for the acceptable level of VOCs in vehicle cabins.

Vehicle interior air quality (VIAQ) is now a major focus for the automotive industry, which is driving innovations in materials that can reduce VOCs. OEMs and their component suppliers routinely evaluate the chemical emissions of their products. In response, manufacturers supplying materials for interior systems likely will increasingly need to ensure that their materials allow for the reduction or elimination of VOC emissions.

By eliminating the need for coating in the manufacture of airbag fabric, automotive OEMs and their suppliers can be confident the fabric provides potential for reducing VOCs, and may help achieve their goals and meet mandates.

China exploring new regulations

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70%

of airbag fabric in Europe is made of silicone-coated polymer.

Step 4:

Recycle and reuse materials — from start to finish.

We estimate there are at least 50kt of silicone coated nylon 6,6 airbags used for frontal airbags. In Europe, nearly 70% of all airbag fabric is silicone coated and thus more challenging to recycle.

As we've already seen, a new fabric production technology eliminates the need for silicone coating and the associated processes that create complexity and waste. Recyclability is built into that process. With no silicone to consider, all cut and sew waste produced throughout the fabric production process can be more easily recycled.

Elimination of the coating also makes the entire product, including waste from the process, recyclable. At the end of life of the airbag, all of the airbag fabric can be re-melted, reclaimed, and returned to high-value use, something that cannot be accomplished with coated fabric. This ability to more easily recycle the airbag may help automakers achieve their sustainability goals and meet regional regulatory requirements.

Every year,

~10,000

tons of post-industrial airbag waste is created in Europe.

Do More With the INVISTA Open Road™ Advantage

INVISTA is one of the world's largest integrated producers of specialty chemical intermediates, polymers and fibers. With an 80-year history of nylon 6,6 production and continued investment in industry capacity and new technology, INVISTA serves as a vital resource for manufacturers and suppliers. Since the invention of nylon 6,6, we have been a leading presence throughout the nylon 6,6 value chain and today we are the world's largest supplier of airbag fiber and ADN.

Now, we've taken this global leadership in fiber technology to the next level with the introduction of Open Road, the first uncoated airbag fabric built on the proven technology described in this eBook. The proprietary process we developed to produce ADN is widely recognized as one of the most efficient and effective in the world. In addition, our exclusive fabric production technology enables the elimination of the traditional silicone coating — saving production steps, materials and energy demand — to deliver an exceptional airbag fabric for your airbag modules and your customers.

Count on INVISTA and Open Road fabric for airbags to help you achieve your sustainability goals and to meet changing regulations and customer expectations.

To learn more about the environmental — and business — benefits that Open Road offers you and your company, visit **openroadfabric.com.**