

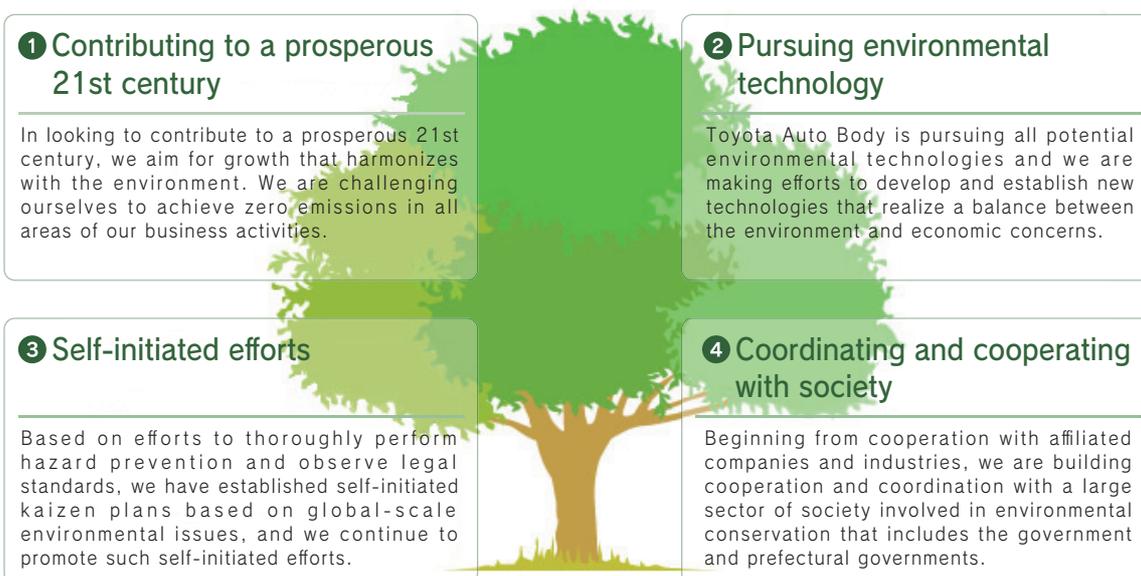
# Environmental Aspects

## Fundamental Thinking on the Environment

### Continuing a Society of Prosperity and Convenient Living Into the Future

In raising our basic principles of “Harmonizing with the Environment” through adopting our “Toyota Auto Body Environmental Basic Policy” in 1993, we next established the “Toyota Auto Body Environmental Action Plan” to be five-year implementation plans for developing concrete activities. From FY2011, we began our “Fifth Toyota Auto Body Environmental Action Plan” which promotes the three-pillar activities of “Building a Low-Carbon Society” , “Building a Recycle-Oriented Society” , and “Building a Society That Coexists With Nature.”

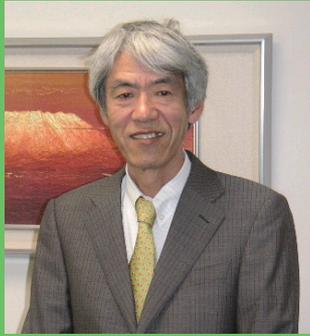
#### The Toyota Auto Body Environmental Basic Policy (Adopted in 1993 and revised in 2004)



#### The Fifth Toyota Auto Body Environmental Action Plan (2011-2015)

	Building a Low-Carbon Society	Building a Recycle-Oriented Society	Building a Society That Coexists With Nature
Product Environment (Development and design)	<ul style="list-style-type: none"> <li>Develop and promote next-generation vehicles that use electrical energy</li> <li>Develop and commercialize lightweight technologies that contribute to improving fuel efficiency</li> </ul>	<ul style="list-style-type: none"> <li>Promote further recycle design, improve part picking, and make efforts toward material separation and differentiation</li> <li>Expand use of recycled materials</li> </ul>	<ul style="list-style-type: none"> <li>Soundly manage products containing chemical substances</li> <li>Promote the development of technologies that switch to fewer substances that burden the environment</li> </ul>
Production Environment (Production and Logistics)	<ul style="list-style-type: none"> <li>Intensify energy-saving activities and reduce greenhouse gas emissions volume</li> <li>Pursue transport efficiency in logistics activities and reduce CO<sub>2</sub> emissions volume</li> </ul>	<ul style="list-style-type: none"> <li>Reduce emissions and take emissions point countermeasures such as effectively using resources and improving yields</li> <li>Reduce the volume of packaging material use</li> </ul>	<ul style="list-style-type: none"> <li>Reduce Substances of Concern (SOC) in production activities</li> <li>Reduce VOCs through decreasing paint and cleaning thinner etc. in painting processes</li> </ul>
Coordinating With Society	<ul style="list-style-type: none"> <li>Promote involvement of companies in the introduction of super-compact mobility on a national scale (P11)</li> </ul>	<ul style="list-style-type: none"> <li>Invest in building a recycle-oriented society promote new businesses</li> </ul>	<ul style="list-style-type: none"> <li>Implement domestic and overseas forestation activities(P31)</li> <li>Promote creating factories that harmonize with nature and coexist with the community(P30)</li> </ul>
Environmental Management (Environmental administration)	<ul style="list-style-type: none"> <li>Promote and strengthen global consolidated environmental management</li> <li>Promote global CO<sub>2</sub> management</li> <li>Promote further environmental activities coordinated with suppliers</li> </ul>	<ul style="list-style-type: none"> <li>Promote sustainable activities</li> <li>Promote sound environmental education</li> <li>Actively participate in Toyota Eco-VAS</li> </ul>	

■ Production Environment Fiscal Year 2015 Target Established [click](#) Fifth Toyota Auto Body Environmental Action Plan [click](#) Fiscal Year 2012 Action Results



Product Environment Committee Chairperson: Hiroshi Ōhashi, Vice President

## Looking Toward Development of Environmentally Friendly Products

In order to contribute to society in the 21<sup>st</sup> century, we are developing and providing environmentally friendly products through further resource-saving while constantly developing finely-crafted products that meet the needs of communities. We are also developing products that surpass our customers' expectations. The pillars of our product development are to make efforts to achieve management of products containing chemical substances, improve fuel efficiency, and provide ease of dismantlement and recycling.

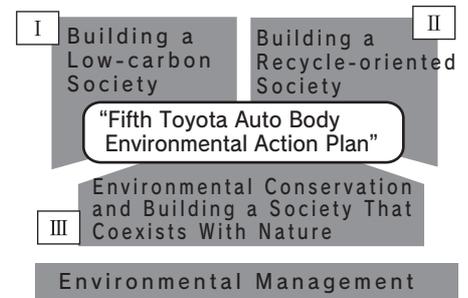
Into the future, further kaizen will allow us to realize continuous growth and the ability to contribute to society through providing products and vehicle manufacturing that harmonizes with the environment of our earth.

### Fundamental Approach

Based on the "Fifth Toyota Auto Body Environmental Action Plan," we have raised the following critical themes:

- I .Development of weight reduction and aerodynamic technologies that contribute to top-rated fuel efficiency performance in looking to become a low-carbon society.
- II .Further progress in recycle design that considers efficient use of resources in looking toward being a recycle-oriented society, and
- III .Global progress in management of chemical substances in products for environmental conservation and coexistence with nature.

With the themes, we develop specific action items and promote comprehensive environmental management.



### <Development Organization and Action Items>

Organization		Action Theme	Action Content	
Product Environment Committee	MI*1 (weight reduction) subcommittee <span style="border: 1px solid black; padding: 2px;">I</span>	■ Improve fuel efficiency	● Developing and commercializing weight reduction technology that contributes to improving vehicle fuel efficiency	
	Recycling and dismantlability subcommittee <span style="border: 1px solid black; padding: 2px;">II</span>	■ Improve recycling and dismantlement	● Parts dismantling time reduction, and applicability and expansion of market disposal resin recycling material	
	Product chemical substance subcommittee <span style="border: 1px solid black; padding: 2px;">III</span>	Vehicle Design W/G	■ Measures for chemical substance regulations ■ Measures for vehicle interior VOC *2 regulations	● Confirming and managing regulated chemical substances , and handling and changeover for environmental regulations of different countries ● Progressing with assessment of diagrams and actual vehicles
		Mass Production W/G	■ SOC *3 auditing activities	● Confirming of no SOC in new products, mass production part sampling inspection, and performing of supplier inspection
	Non-subcommittee activities <span style="border: 1px solid black; padding: 2px;">I</span> <span style="border: 1px solid black; padding: 2px;">III</span>	■ LCA *4 evaluation (Life Cycle Assessment) ■ Measures for polyvinyl chloride usage volume regulations (Japan, Europe) ■ Improve fuel efficiency	● Investigating materials and weight, and confirming CO <sub>2</sub> reduction ratio ● Having less than 1.5% chlorine volume ● Developing and commercializing aerodynamic technology for improving vehicle fuel efficiency	

\*1 MI:Mass Innovation

\*2 VOC:Volatile Organic Compounds

\*3 SOC:Substance Of Concern

\*4 LCA:Life Cycle Assessment



## Building a Low Carbon Society

# Aiming Toward Top Class Fuel Efficiency Performance Through Promoting Weight Reduction Technology

In considering the impact of important environmental concerns regarding energy and global warming on humans and ecological systems, we are making efforts to reduce CO<sub>2</sub> emissions volume in product development and save resources and energy at vehicle development and design stages.

## Promoting the Development of Weight Reductions That Improve Vehicle Fuel Efficiency

### Fundamental Efforts

We are considering further strategies through active discussion among all involved in weight reduction technologies who are concerned with technical development theme issues.

Toyota Auto Body MI Subcommittee meetings serve as a significantly useful place for promoting technical development through essential contact matters for design and production engineering regarding the application of themes of construction streamlining, high-tensile strength steel sheets, and resin-plastic materials.

In addition, we are making use of many previously achieved technical development results, such as high-strength tensile steel sheeting.



B Pillar Section: Hot stamp \*2

An MI Section Meeting in which Development Group and Production Engineering Group executives and general managers debate by using genchi-genbutsu (on-site, hands on).

\*1: MI Subcommittee meetings promote unified weight reduction technology efforts of the Development Group and Production Engineering Group to improve fuel efficiency.  
MI : Mass Innovation

### MI Subcommittee Secretariat: Voice of the Person in Charge



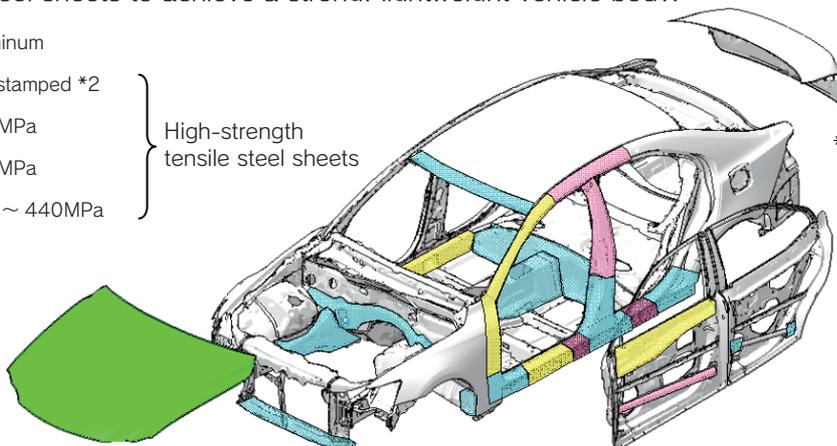
Product Planning Center-TYZX  
Motoyuki Suzuki

In aiming toward the "world's lightest vehicle body," we are coming together as one team to discuss planning, design, and testing in challenging to achieve our target.

## <Case Example : Lexus IS weight reductions through use of body high-strength tensile steel sheets, hot stamp\*2, and aluminum.>

We are using previous production materials of aluminum and also 340MPa-440MPa grades of high-strength steel sheets to which we have effectively added hot-stamped materials as well as 590 MPa and 990 MPa grade high-strength steel sheets to achieve a strong, lightweight vehicle body.

-  Aluminum
  -  Hot stamped \*2
  -  980MPa
  -  590MPa
  -  340 ~ 440MPa
- } High-strength tensile steel sheets



\*2 Hot stamp :

A forming method of parts whereby a steel sheet is formed when made soft by applying high temperature to the sheet, which is then quenched hardened by cooling of the sheet as it is formed when the sheet contacts a die assembly.

## Building a Recycle-Oriented Society

# Further Promotion of Recycle Design that Considers Effective Use of Resources

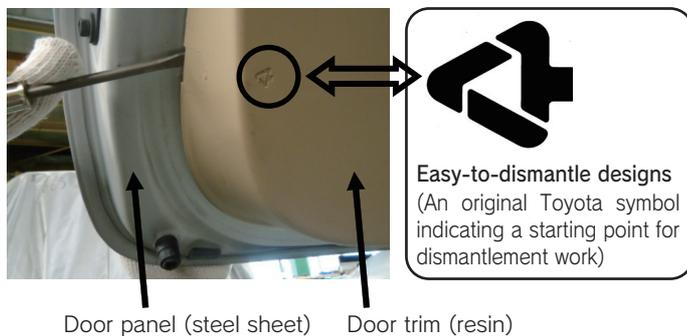
With awareness of the limitation of all resources, we apply our pillar of 3R (Reduce, Reuse, Recycle) in making efforts to develop and design vehicles that are easy to dismantle and recycle.

## Improving vehicle dismantlement

In order to effectively use resources, we aim toward improved vehicle recyclability that is reflected in vehicles developed and also our research into vehicle construction that allows for easy dismantlement.

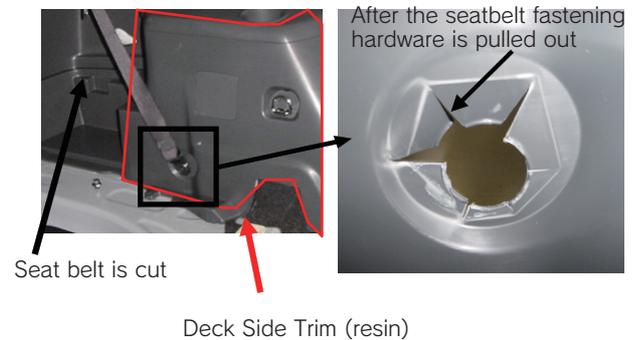
### Recycle Design For Improved Dismantlement

#### <Case example: Door trim removal>



For easy removal, we have made a space for inserting the removal tool and also indicated the starting point in dismantlement work with the Improved Dismantling Mark.

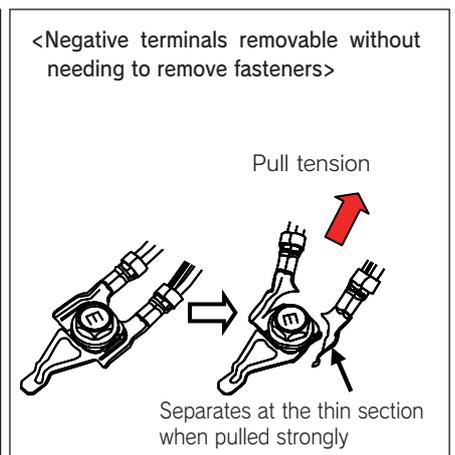
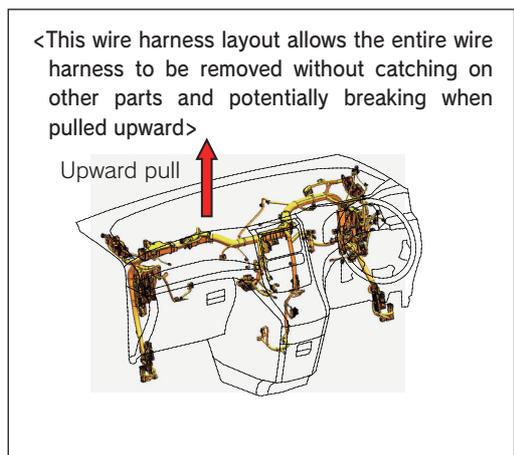
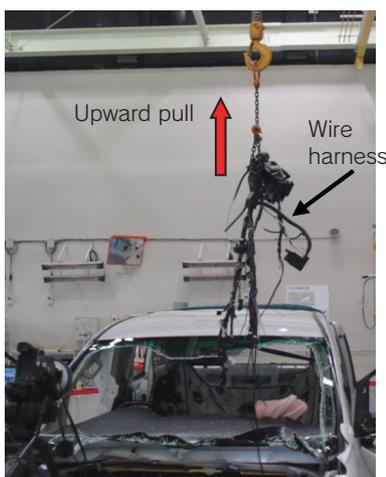
#### <Case example: Deck Side Trim removal>



We designed thin V-shaped grooves to allow the trim to be removed without having to remove the seatbelt fastener.

#### <Case example: Wire harness removal construction>

(Removal method)  
Removal by pulling with a crane



We use an efficient wire harness removal method, whereby removal by pulling is done with a crane. However, wire harness positioning is designed to prevent other parts from being pulled, and we use negative terminals able to separate similarly to pull tabs when strongly pulled.

### Dismantlement Assessment: Voice of the Person in Charge



Prototype Production Div. Prototype Assessment Dept.  
Shoji Nishii

I want to leave resources for the children of the future.  
My thinking on assessment efforts is to allow the vehicles we provide to be used effectively and also link our resources to the future.

## Building a Society That Coexists With Nature

# Promoting Chemical Substance Management in Products

Toyota Auto Body is progressing with switching to fewer substances that impact our environment by coordinating with business partners, such as suppliers of raw materials and parts, to assess risk and understand the use of chemical substances in products.

## Sound Management of Chemical Substances in Products

### Measures for the Four SOCs

The Four SOCs	Production business unit
Lead, mercury, cadmium, and hexavalent chrome	Eliminated in August, 2006 (European ELV Regulated *1 for other than use for applicable exclusion)

Holding a chemical management briefing



### Measures for Chemical Substances Regulations

Chemical substance regulations, such as "European REACH regulations" (published in 2007) \*2, are being more strongly enforced.

With the necessity of reliable measures for environment regulations, Toyota Auto Body is collecting and managing information on chemical substances in products. We are progressing and cooperating together with Toyota Motor Corporation and our business partners to switch to fewer chemical substances that burden our environment.

In April of 2012, we revised our "Toyota Auto Body Group Green Purchasing Guideline."

All 459 companies participated in a presentation meeting for achieving management of chemical substances of our business partners.

From October, we began to use a JAMA sheet for collecting information on chemical substances in parts in new equipment. In February of 2013, we held an IMDS\*4 supplier presentation meeting for our business partners, and we began data entry in IMDS from April.

- \*1 European ELV Regulations : End-of-Life Vehicles  
European Union regulations concerning vehicles for scrap.
- \*2 REACH : Registration, Evaluation, Authorization and Restriction of Chemicals  
Regulations for clarifying the responsibility of industries in the management of chemical substances. These regulations also protect human health and the environment from such chemical substances
- \*3 JAMA sheet : A ledger agreed for use by the Japan Automobile Manufacturer Association and the Japan Automobile Part Manufacturing Association for use in surveys of materials and compounds used in products.
- \*4 IMDS : International Material Data System  
A production material information system for the automotive industry

### VOC Reduction in Vehicle Cabins

VOC\*5 (Volatile Organic Compounds), such as toluene, xylene, and formaldehyde, that volatilize from vehicle cabin parts are said to be potentially harmful to one's health. In order to reduce such vehicle cabin VOCs, Toyota Auto Body continues to re-examine vehicle cabin materials, processing methods, and adhesives.

FY2013 New models on sale and full model change vehicles	Action status
IS	Cleared JAMA self-initiated targets

\*5 VOC : Volatile Organic Compounds

### Substances of Concern (SOC)

#### Voice of the Person in Charge



Material Engineering Div.  
Material Engineering Dept.  
Yuji Miura

In looking to reduce SOCs, we are making efforts to promote switching materials and also finding established substitute technologies. We are going to actively promote SOC reduction technologies in order to continue to provide products with minimal environmental impact.



Production Environment Committee Chairperson:  
Akitsugu Ishiguro,  
Vice President

## Looking Toward Making Factories That are Kind to the Earth's Environment and Harmonize With Nature

We are progressing with the further reduction of environmental burden from production activities, with vehicle manufacturing that harmonizes with the earth's environment as a starting point.

- (1) Creation of simple and streamlined energy-saving production lines
- (2) Use of recyclable energy and development of resourcing-saving and recycle-oriented processing methods
- (3) Meticulous equipment operation management and daily kaizen
- (4) Promotion of factory greenification activities and creation of opportunities to interact with nature, such as with a biotope experience.

Going forward, we look to continue to contribute to the development of society and the earth via ongoing environmental conservation activities.

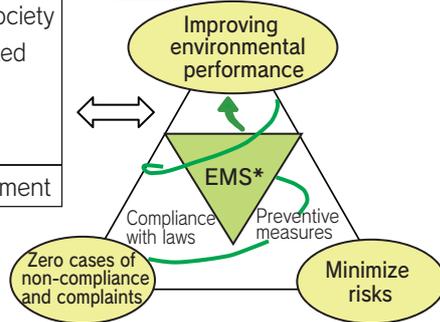
### Fundamental Thinking on Our Actions

With the core of our Environmental Management System (EMS), we are promoting the three pillars of "Compliance with environmental laws," "Preventive measures," and "Performance improvement".

#### "Fifth Toyota Auto Body Environmental Action Plan"

- Building a low-carbon society
- Building a recycle-oriented society
- Building a society that coexists with nature
- Environmental Management

#### Production Environment Activities: Three Important Pillars



\*: Environmental Management System

<b>Compliance with environmental laws</b>	<ul style="list-style-type: none"> <li>① Establishment and management of self-initiated standard values</li> <li>② Cross development of non-compliance and complaints, and case examples of near-miss accidents.</li> <li>③ Thorough daily management</li> </ul>
<b>Preventive measures</b>	<ul style="list-style-type: none"> <li>① Assured development of risk reduction activities</li> <li>② Promotion of prevention measures that include information leaks</li> </ul>
<b>Environment Performance Improvement</b> (CO <sub>2</sub> , resource-saving, etc.)	<ul style="list-style-type: none"> <li>① Reduction of environmental burden by countermeasures to be taken at the source</li> <li>② Elimination of waste through equipment operation kaizen</li> <li>③ Introduction and development of innovative technology for saving resources and energy</li> </ul>

### < Production Environment Action Organization and Action Items >

Organization		Action Items
Production Environment Committee	<b>Production Environment Committee</b> (At each plant)	<ul style="list-style-type: none"> <li>① Reduction of environmental burden through improvement of productivity and kaizen of operational methods</li> <li>② Appropriate daily equipment operation and maintenance management</li> </ul>
	<b>Plant Production Environment Committee</b> (Production Engineering Div.)	<ul style="list-style-type: none"> <li>① Product streamlining via model changes, and kaizen of processing methods</li> <li>② Energy-saving type production line creation in plant renovations, and development of low CO<sub>2</sub> emission production technology</li> <li>③ Introduction of renewable energy and improvement of energy supply efficiency</li> </ul>
	<b>Toyota Auto Body Group Production Environment Meeting</b> (At each production consolidated subsidiary)	<ul style="list-style-type: none"> <li>① Cross development of environmental action activities at Toyota Auto Body group companies</li> <li>② Spreading of CO<sub>2</sub> reduction activities in each business activity</li> <li>③ Thorough environmental hazard risk prevention and compliance with environmental laws in all countries and regions</li> </ul>

## Building a Low-Carbon Society

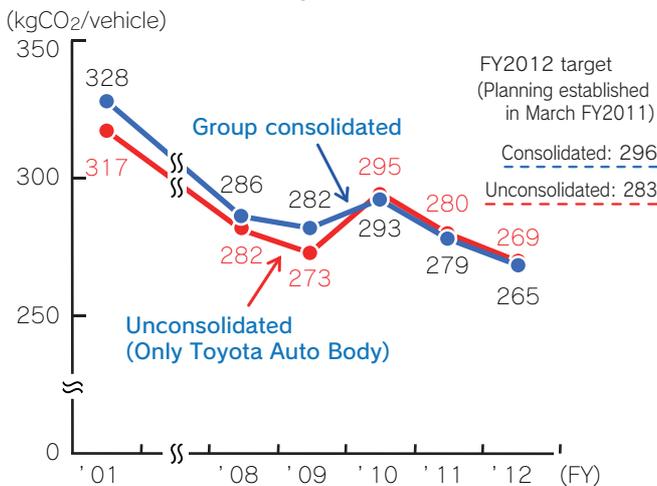
# Reducing CO<sub>2</sub> Emissions Volume and Thorough Energy-Saving Activities in Production Activities

Toyota Auto Body is promoting appropriate equipment operation and eliminating daily inefficiencies, and also pursues improved productivity on the production line and the development and introduction of low-CO<sub>2</sub> production technology. We are also making further efforts to improve transport efficiency in production logistics.

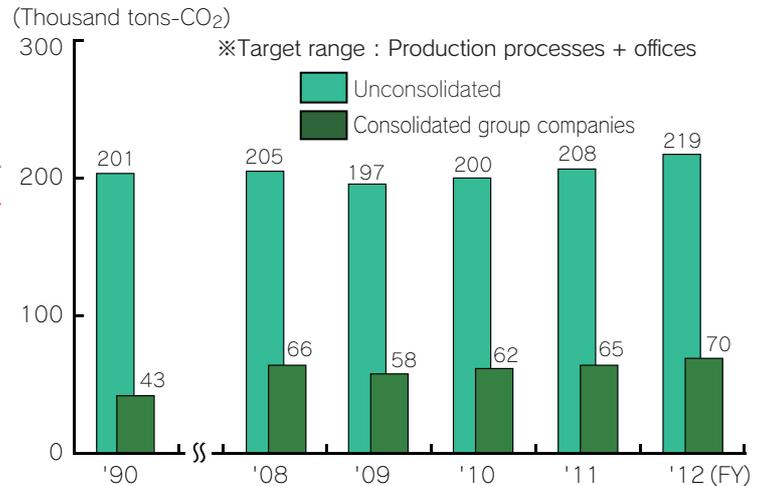
### Actively promoting CO<sub>2</sub> reductions through energy-saving activities.

In FY2012, we reduced heat release losses from the drying oven by modifying the painting process at our Fujimatsu Plant. Further reductions were achieved during non-operation through meticulous stopping of machinery and incorporating electrical power-saving circuits during waiting time between tasks of welding robots. We were able to achieve a 4% reduction in CO<sub>2</sub> emissions volume per vehicle compared to the previous year; however, CO<sub>2</sub> emissions volume increased from the previous year due to the increase in vehicles produced and other factors.

#### CO<sub>2</sub> emissions volume per vehicle



#### CO<sub>2</sub> emissions volume



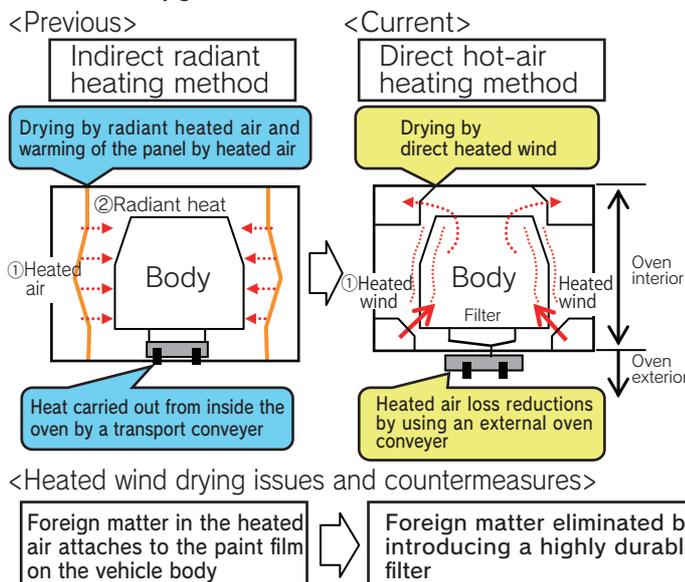
### Case Example

#### <Energy savings in the primer-coat drying oven and sealer process in the Fujimatsu Plant No.2 painting line>

Reduced losses in drying oven heat release from modification of the painting process, and we reduced CO<sub>2</sub> emissions volume by positioning the air-conditioner in the sealer process.

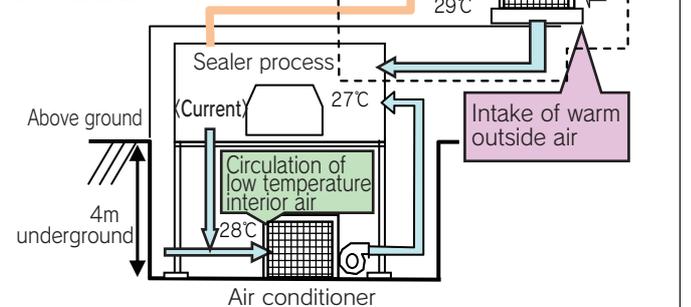
#### Reduced application of heat energy in the primer-coat drying oven

We achieved reductions in heat release losses by positioning of the transport conveyer outside of the oven and also introducing an energy-efficient direct heat application method, and we also reduced the amount of city gas consumed.

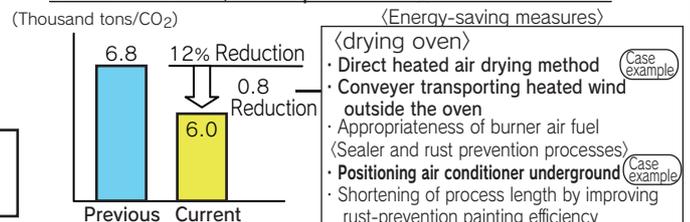


#### Summer air conditioning energy savings in the sealer process

By using low temperature underground air against air aboveground, we positioned the air conditioner underground and we reduced electricity consumption by lowering the intake air



#### Primer-coat oven, sealer process CO<sub>2</sub> emissions volume



## Building a Recycle-Oriented Society

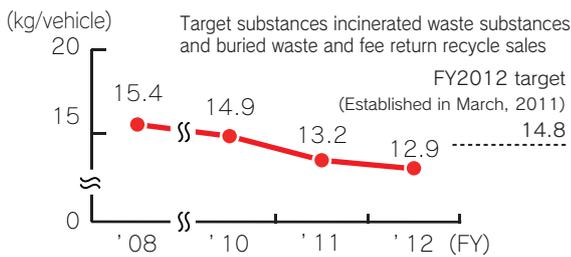
# Effectively Using Resources and Reducing Emissions

We are promoting such activities for effective resource use as improving yields during production, creating countermeasures for emissions points, and reducing packaging materials in shipping.

## Reducing emissions and effectively using resources

In further promoting effective resources use, we are making efforts to reduce external emissions through emissions points, such as by improving yields and promoting the development of renewable resource technology.

### Waste Substance Emissions Volume



### Main efforts to reduce waste substances

- Reducing the water ratio in recyclable paint in painting processes
- Recycling and the separation of metal composite materials
- Maintenance and properness of waste treatment process operation conditions

### Case Example

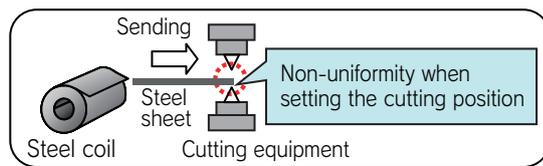
#### <Reducing waste materials at the Inabe Plant Steel Sheet Cutting Line>

On the cutting line, the end sections of settle sheets because waste metal when changing the products for cutting such as steel coils and production parts.

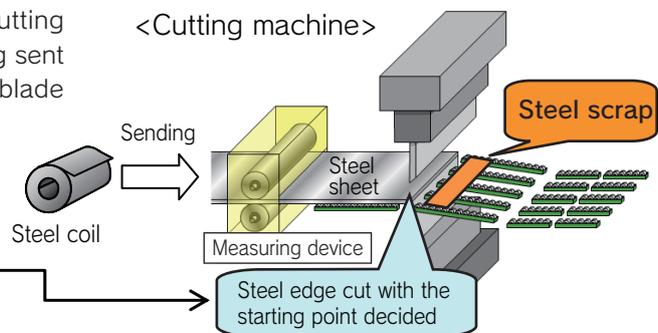
We eliminated steel sheets waste by performing kaizen to control position measurement for plate edge cutting and also automatic sheet sending equipment.

#### <Previous method>

Misalignment of steel sheet materials and blade cutting edge non-uniformity volume of steel material being sent resulted in the steel sheet extending beyond the blade cutting edge.



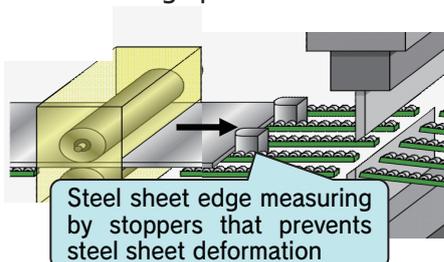
#### <Cutting machine>



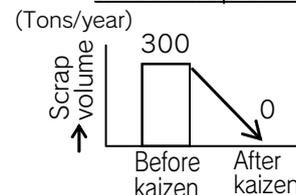
#### <Current method>

We performed kaizen to determine the cutting position by automatically sending the steel sheet to the cutting blade by positioning stoppers in front of the cutting machine that measures the position of the steel sheet edge.

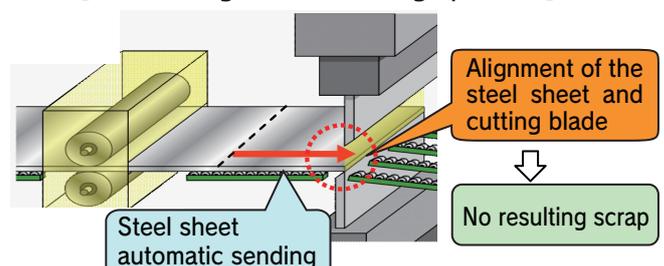
#### [Steel sheet edge position measurement]



#### Steel scrap reductions



#### [Determining steel sheet edge position]



## Building a Society That Coexists With Nature

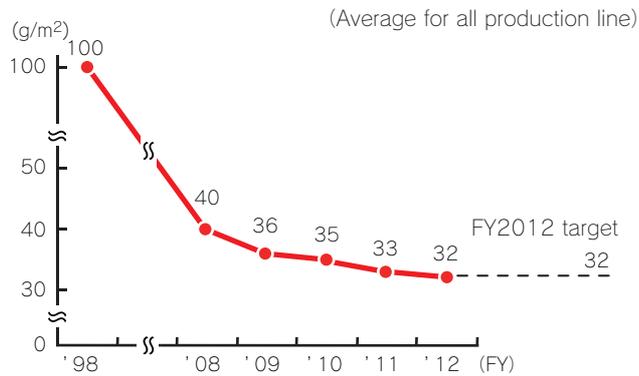
# Reducing SOCs in Production Activities

Toyota Auto Body is coordinating with business partners, such as suppliers of raw materials and parts, and also we are understanding the use and assessing risks in promoting reductions in SOC volume and a change to more environmentally friendly substances.

## VOC Emissions Volume Reduction Activities in Production Processes

In order to decrease VOCs (Volatile Organic Compounds) in paint and thinner used when painting vehicles, we are promoting improved recovery ratios, reduced volume of both thinner and paint used, and a switch to waterborne paints. In fiscal year 2012, we improved VOC per painted vehicle unit area on the No.1 Painting Line at our Inabe Plant by switching to waterborne paint.

VOC Emissions Volume Per Painted Vehicle Unit Area



Main Efforts to Reduce VOCs

- Switching to waterborne paints for vehicle bodies

	2005	2010	2012
Fujimatsu Plant	[Green bar indicating activity]		
Yoshiwara Plant	[Green bar indicating activity]		
Inabe Plant	[Green bar indicating activity]		

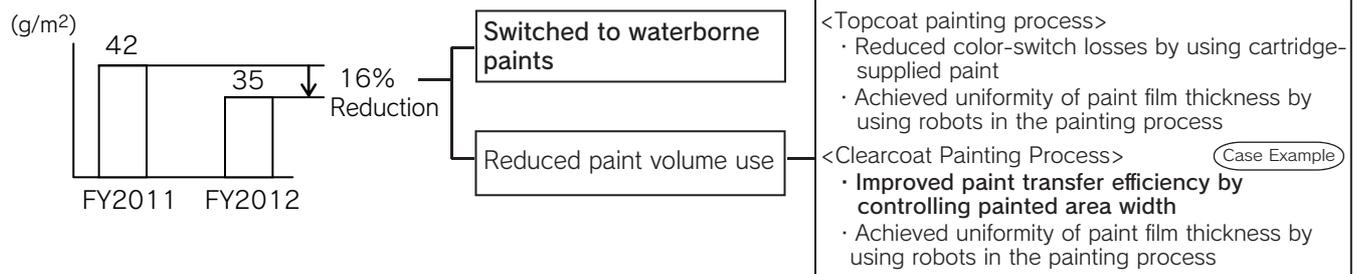
- The volume of cleaning thinner used was reduced and the frequency of switching to clean the same color is now proper
- Disposal volume of cleaning thinner was reduced and equipment was installed that recovers thinner from spray processes

### Case Example

#### < VOC Emissions Reduced on the No.1 Painting Line at Our Inabe Plant >

We reduced VOC emissions volume by improving paint transfer efficiency when spray painting, and by switching to waterborne paint for topcoat paint

Inabe Plant Body Paint VOC Emissions Per Unit of Painted Area

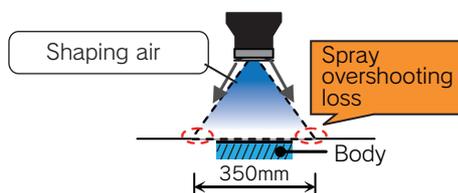


#### Improved Paint Transfer Efficiency by Controlling Painted Area Width

The pattern of spray painting vehicle bodies is formed by shaping air to control spray width. Shaping-air, emitted from the clearcoat process painting machine, currently doubles to form an outer and inner spray width, which improves paint transfer efficiency by variable control of spray adjustable for body shape and spray target dimensions.

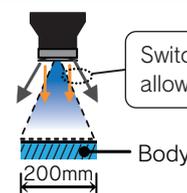
< Previous spray method >

Spray width constant

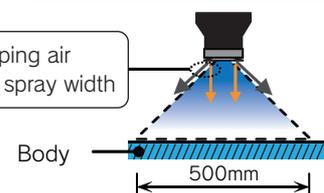


< Current spray method >

Spray width narrowed by using a thin, long spray nozzle



Paint spray width widened for larger, flat surface coating



# Environmental Aspects

## Environmental Management

### Promoting Global Consolidated Environmental Management

Toyota Auto Body is promoting eco-factory activities within a management system we have coordinated with domestic and overseas group companies, business partners, and our communities. These eco-factory activities assure incorporation of environmental measures from planning through to production for new plant facilities and when installing production equipment for new products. We are also making efforts in our environmental education to advance environmental knowledge and develop human resources capable of action.

### Strengthening and Promoting Consolidated Environmental Management

We are continuously sharing information on project items and target development for our 5th Environmental Action Plan for Toyota Auto Body group companies. In fiscal year 2012, we set out to confirm progress of our environmental efforts for our domestic and overseas production companies, checked the status of prevention measures for risk of on-site information leaks, and calculated energy savings. We are also promoting proposals for kaizen plans for items requiring improvement.

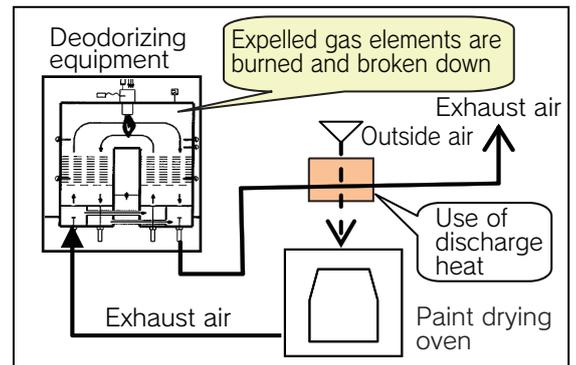


Inspecting energy savings of a water-cooling supply pump (Indonesia S/C)

### Overseas Vehicle Production and New Plant Eco-Factory Activities

We carried out eco-factory activities that assured incorporation of environmental measures, and we are also coordinating with all our business from the production equipment planning stage at both TAW(Thai) and S/C(Indonesia) vehicle production plants.

At TAW(Thai), we have incorporated new, environmentally friendly technology. For example, we installed an after-filter to the exhaust duct of the paint spraying process and also installed deodorizing equipment.



Cumulative-heat type deodorizing equipment TAW(Thai)

### Advancing Environmental Education

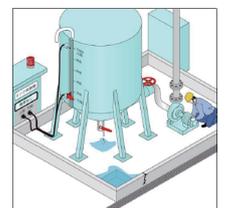
Heightened environmental awareness and the ability to continuously incorporate such awareness into one's work is important for all our employees. Toyota Auto Body is promoting environmental education and environmental enlightenment activities to serve as a pillar for developing our own employees and those of Toyota Auto Body Group companies.

We implemented overseas student training curriculum that incorporates environmental education and in fiscal year 2012, education using environmental KY \* education and other instruction was provided for or TAC(Thai), TAW(Thai) and S/C(Indonesia) that uses case study examples of near-miss environmental accidents.



Overseas trainees (Thai TAW) receiving Environmental KY education

Environmental KY\* text [Pump maintenance operations]



\*KY: Kiken Yochi (danger anticipation)

Environmental Education

### Other Environmental Data

Resource Input Volume and Emissions Volume in Business Activities

Environmental Accounting

Active Participation in Toyota Eco-VAS

Active Release of Environmental Information