

Energy and Global Warming

We at the Toyota Auto Body are promoting efforts to reduce CO₂ emissions volume through logistics efficiency, elimination in energy losses, *kaizen* in everyday applications, and introduction of new technologies involving development and production processes in weight reduction technology.

The aim of such efforts is to improve fuel efficiency as we look to have reduce carbon in society.

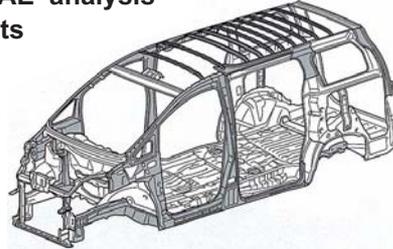
| Action items | FY2007 Efforts | Progress Status |
|--------------|--|--|
| | Development and Design <ul style="list-style-type: none"> ● Achieve weight reduction target by incorporating weight reducing technologies in the new LAND CRUISER and ALPHARD models | <ul style="list-style-type: none"> ● Achieved weight reduction target by reassessing interior material quality and using high strength steel sheets |
| | Production and Logistics <ul style="list-style-type: none"> ● Promote measures for reducing CO₂ emissions volume | <ul style="list-style-type: none"> ● Implemented energy-saving measures for production processes and new products ● Nine domestic consolidated companies promoted CO₂ emissions volume reductions |
| | <ul style="list-style-type: none"> ● Promote activities to reduce CO₂ emissions volume through global consolidation | <ul style="list-style-type: none"> ● Nine domestic consolidated companies promoted CO₂ emissions volume reductions |
| | <ul style="list-style-type: none"> ● Reduce logistics related CO₂ emissions volume | <ul style="list-style-type: none"> ● Promoted reductions in CO₂ emissions volume in logistics |

Development and Design Development of Weight Reduction Technology That Contributes to Improved Fuel Efficiency

We achieved vehicle body weight reduction for the new Alphard and Land Cruiser models by using new resin molding methods, optimizing body panel thickness, designing body structure by using CAE (Computer Aided Engineering), and expanding use of weight reducing materials such as high strength steel sheets.

Vehicle weight reduction through CAE analysis and use of high strength steel sheets

Using many high strength steel sheets in the cabin frame structure, we achieved a light weight and rigid body which ensures stable operability and crash safety with reductions in vibration and noise.



Changes to lighten the floor silencer

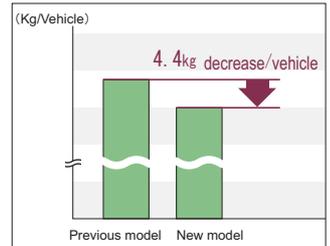
Changes to lighten the floor silencer have achieved weight reduction that limits excessive noise transfer to the cabin from the tires and engine through changing from a previously used asphalt sheet vibration control type coating, along with optimizing the position of the coating in the frame.



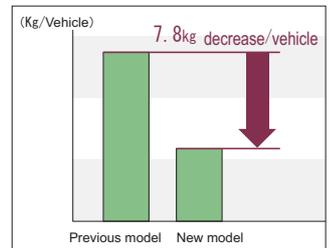
Weight reductions from reviewing interior material quality and construction methods.

We reduced weight in the Land Cruiser's interior and we are continuing to ensure sound absorbing performance through changes made to floor carpet materials and inner door trim noise dampening materials. In addition, weight reductions were also achieved in the Alphard through continuing to ensure stiffness with bubble molding used in interior panels, such as door trim.

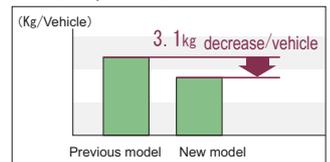
Body (cabin frame) weight per vehicle [ALPHARD]



Floor silencer weight per vehicle [Land Cruiser]



Door trim weight per vehicle [Alphard]





Activity Status

Production and Logistics Active promotion of measures to reduce CO2 in production activities

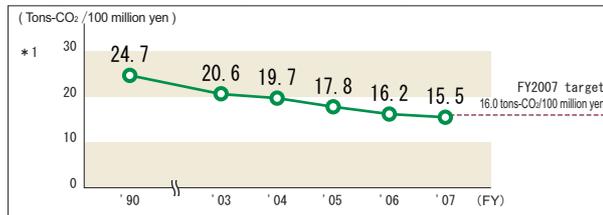
Our efforts to reduce CO2 involve activities such as introducing new technology and thoroughly eliminating efficiency waste from production lines. Already we have made great progress in achieving our FY2010 target for CO2 emissions volume per unit of sales. In looking to achieve further efficient production, we will promote even more stringent fiscal year targets. Our activities to reduce CO2 in production processes that coincide with our FY2007 planned model change with our energy-saving factory climate control and a decrease in the number of vehicle body welding points were not able to achieve our fiscal year target because of production increases of new vehicles.

Also, during this fiscal year, new and expanded large scale production process equipment involving transport and storage of parts from other companies resulted in increase in CO2 emissions volume (16,600 tons-CO2).

Although we incorporated the latest energy-saving technology for installing the new and expanded equipment, combining CO2 emissions volume from previous processes resulted in a total of 201,800 tons-CO2 (8% increase from FY1990).

Hereafter, for upgrading older painting processes we will be certain to promote decreases in CO2 by adding this as an additional action item involving saving energy for large scale equipment and facility upgrades.

CO2 emission volume per sales unit [FY2010 target: Less than 18.5 tons-CO2 /100 million yen] (10% decrease compared to FY2003)

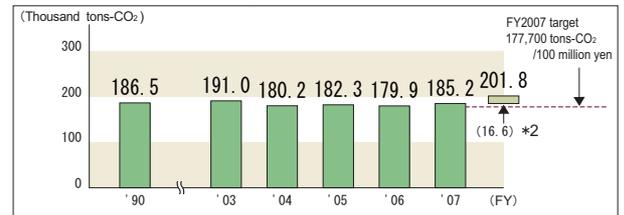


*1 The CO2 emissions volume per sales unit also includes offices for calculations done at Toyota Auto Body.

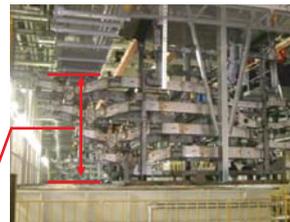
Yoshiwara Plant kaizen case example for new equipment processes — Energy saving on the chassis electrodeposition coating line —

We achieved large energy savings by low speed operation control when not activating a paint cycle pump and fluctuating process lengths by such methods as loading efficiency of chassis parts. (Four-layer loading resulted from pallet kaizen and new ways of placing loads.)

CO2 emissions volume in production processes [FY2010 target: Less than 168,700 tons-CO2] (10% decrease compared to FY1990)



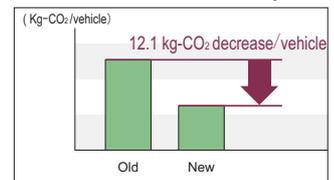
*2 Large scale new and expanded equipment included in this fiscal year calculation (Reference case example that incorporates energy saving in the new chassis electrodeposition-coating line below)



Chassis part loading (four-layered loading)

Chassis frame electrodeposition coating line

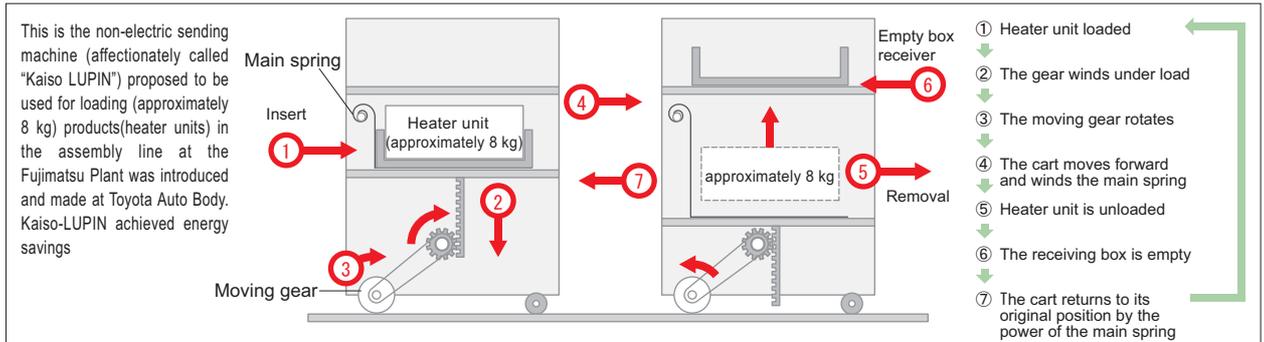
Chassis electrodeposition coating line CO2 emissions volume per vehicle



■ Development of non-electric part sender applied using a wind-up (*karakuri*) mechanism

In our production processes, we are aiming for “zero energy” for such applications as part transporting equipment, whereby operators worked together to propose the idea of “non-electric mechanized equipment” which has been created and introduced at Toyota Auto Body. By FY2007, such non-electric mechanized equipment will be contributing to energy savings, and we plan to have this mechanism number five pieces of equipment for body processes, eight in the painting processes, and 21 in the assembly processes.

■ The workings of the non-electric part sender (Case example of the Fujimatsu Plant assembly process)



● Look here to see a moving image of the non-electric part sender
<http://www.toyota-body.co.jp/english/csr/report/2008movie1.html>



Production Group
 Michinobu Shimokawa (Left)
 Tomio Itabashi (Right)



Production Group
 Tetsuro Ohya (Left)
 Yoshiaki Shigematsu (Right)

Voices of the inventors

We had a challenging time deciding the quality for the moving wheels and ways to reduce frame weight to make the sending machine work smoothly.



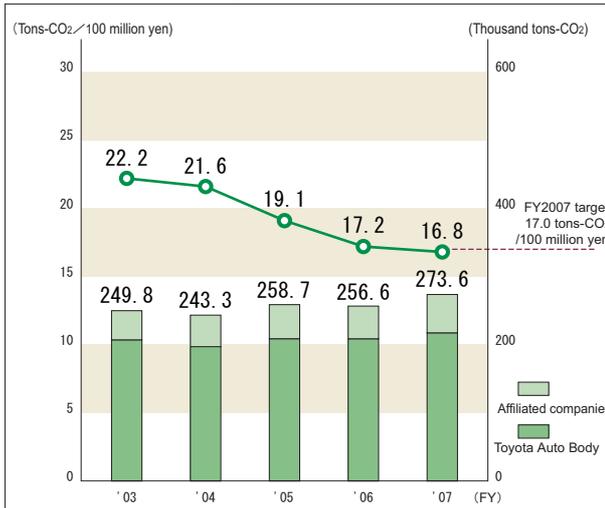
Kaiso-LUPIN

Activity Status

Production and Logistics Reduction Activities for Global CO₂ Emissions Volume

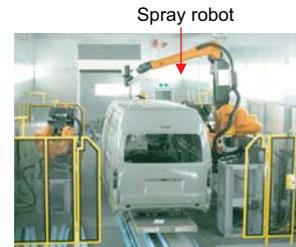
We are promoting CO₂ reduction activities through matching the pace of domestic and overseas consolidated subsidiaries (10 companies) in mutually releasing energy-saving case examples. For our activity target of CO₂ emissions volume per sales unit, we have already made great progress in achieving our FY2010 target (24% reduction compared to FY2003); however, in terms of total emissions volume, emissions volume increased 9.5% compared to FY2003 due to the addition of new businesses.

■ **CO₂ Emissions Volume Per Global Sales unit**
 [FY2010 target: Less than 20.4 tons-CO₂ / 100 million yen]
 (8% decrease compared to FY2003)



● **Consolidated Subsidiary Energy-Saving Activity Case Example — Energy-saving Body Intermediate-Coat Painting Process (Gifu Auto Body) —**

At Gifu Auto Body Co., Ltd., an emphasis has been placed on painting processes from FY2007 with efforts to increase equipment performance. However, with completion of one aspect of the “body intermediate-coat painting line,” and also recycling technology for spraying room climate control emissions, we have achieved great progress in energy savings through shortening process length by using spray robots and introducing the latest energy-saving technology.



Body intermediate-coat line starting operation

■ **Intermediate-coat Painting Process**
 Effectiveness of CO₂ emissions volume reduction per vehicle



Other than Toyota Auto Body, relevant global consolidated subsidiary companies are as follows:

Domestic: Tokai Utility Motor Co., Ltd., Toyota Body Seiko Co., Ltd., Ace Industry Co., Ltd.

Tokai Parts Industry Co., Ltd., and Gifu Auto Body Co., Ltd. (Gifu Auto Body Co., Ltd. became a consolidated subsidiary of Toyota Auto Body in October 2007).

Overseas: Chun Shyang Shin Yeh Industry Co., Ltd., P.T. Sugity Creatives Co., Ltd., T-TEC(P.T.Toyota Auto Body-Tokai Extrusion),

Thai-TAC(Thai Auto Conversion Co., Ltd.), and TABM(Toyota Auto Body Malaysia Sdn. Bhd.)

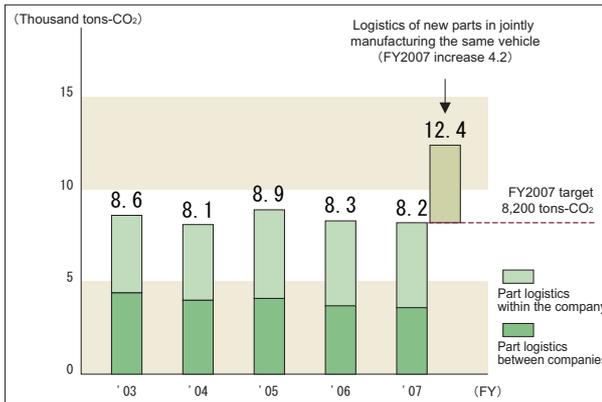
(Gifu Auto Body Co., Ltd. was retroactive to FY2003, and T-TEC and TABM were added from FY2007). In addition, the entire portion for Toyota Auto Body includes offices.

Production and Logistics Reduction of CO₂ Emissions Volume in Logistics

Our activities to decrease CO₂ in logistics, involving electrification of towing vehicles in our plants and also improving loading efficiency, are achieving CO₂ decreases according to plan for our previous scope of logistics. Emissions volume was also calculated for logistics of new parts being used in jointly manufacturing the same type of vehicle with another company, which is making efforts to improve loading efficiency from the transport and planning stages.

■ Logistics-related CO₂ emission volume

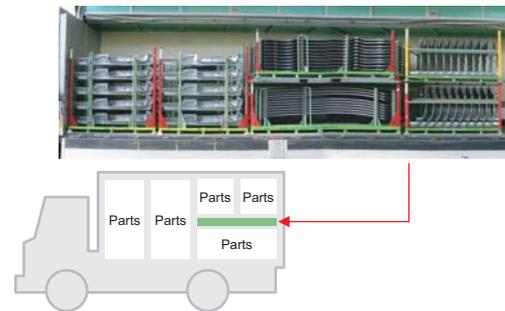
[FY2010 target : Less than 8,000 tons-CO₂]
(10% decrease compared to FY2003)



● Logistics CO₂ Reduction Case Example

— Making Logistics for New Parts Efficient —

From the planning stage of shipping parts, we developed transport hardware that allows stratified loading of different large and small parts. By greatly decreasing the number of trucks carrying parts, we achieved reductions in CO₂.



“Movement to Reduce Plastic Shopping Bags at the Check-out Register” was Introduced Throughout the Toyota Auto Body Group

Toyota Auto Body began a “Movement to Reduce Plastic Shopping Bags at the Check-out Register” by coordinating with the Toyota Auto Body Coop in an effort toward preventing global warming. At registers at Toyota Auto Body company shops, we actively ask, “Do you need a bag?” By asking this question, we are calling for every employee to take part in global warming prevention activities. Before this movement began, in December 2007, we offered and distributed a personal reusable shopping bag to all employees who desired one.

