They Say Everything is Bigger in Texas... Except Toyota’s Environmental Footprint

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Toyota Manufacturing & R&D in N.A.
Manufacturing Production in N.A.

- Camry
  - Camry Hybrid
- Avalon
  - Avalon Hybrid
- Corolla
- Lexus RX 350/450h
- Sienna
- Tacoma
- RAV4
  - RAV4 Hybrid
- Highlander
  - Highlander Hybrid
- Sequoia
- Tundra
- Lexus ES 350
TMNA Impact (as of 2016)

**Total Investment:**
- $29.1 Billion

**Employment:**
- 46,400

**Vehicle Production:**
- 2.12 Million

**Local Purchasing:**
- $35.3 Billion
World Around Us is Changing, Global Development Increasing CO2
Aiming to Establish a Future Society in Harmony with Nature

Toyota Environmental Challenge 2050
Challenge to Zero & Beyond
So... What is Challenge 2050
Challenge 1: Vehicle CO$_2$ Emissions

Next generation vehicles to accelerate technological development to follow market expansion of HV
Next generation vehicles approaches zero CO2 during driving however, steps back in material, parts/vehicle production
Eliminate all CO₂ emissions from Toyota facilities, logistics and processes.
Challenge 4: Toyota facilities & processes conserve & protect water resources

“Thoroughly reduce the amount used”
“Thoroughly clean drainage”
Challenge 5: Toyota facilities & processes support a recycling-based society

Vehicle Design and Manufacturing:
(1) Utilize eco-friendly materials
(2) Use parts longer
(3) Develop recycling technology
(4) Reuse materials from end-of-life vehicles
Challenge 6: Toyota facilities & processes operate in harmony with nature

2. Activity outline (Overall image) of "Plant in Harmony with Nature"

Contribute to conservation of local biodiversity by connecting to “Living creatures”, “Habitat”, “People” and “Region”

- **Action I**: Decision of indicator species
- **Action II**: Creation, maintenance & improvement of habitats
- **Action III**: Ecosystem evaluation by checking indicator species
- **Action IV**: Publicity in collaboration with NGO etc.

Yokoten to off-site, neighbor plants (including other companies)

- Contribute to building ecosystem networks

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“People” ◆ Employees themselves act 😊

“Region” ◆ Together with local residents 👩‍🌾 ◆ Cooperation with local experts 👤

Promote human resource development and communication
Inside Challenge 1: Vehicle CO$_2$ Emissions

Toyota’s innovative FC unit

Efficiency and reliability
Challenge 1: Vehicle CO₂ Emissions

- 2.35 megawatts of electricity
- 1.2 tons of hydrogen per day
- Enough to power roughly 2,350 homes
- Meet the daily driving needs of nearly 1,500 vehicles
Challenge 1: Vehicle CO$_2$ Emissions
Challenge 1: Vehicle CO₂ Emissions
Energy Management is not new to Toyota

Since 2003, reduced energy needed per vehicle by 38% across our 14 North American manufacturing facilities.

Since 2003, saved 6 million metric tons of CO₂.

CARBON

CARBON is one of Toyota’s four focus areas in North America. We are working to reduce the carbon footprint of our products and our operations, and conducting outreach activities that help our stakeholders do the same. Climate change is a significant challenge facing the global community. We are working at every stage of the vehicle life cycle to help the world build a low carbon future.

Highlights:

1. Toyota Mirai is the only 300 mile range fuel cell sedan, fuel and emits only water.
2. We received our 11th Excellence Award for our plants that have reduced their energy consumption.

Watch the video.
Stationary CO$_2$ Reduction Strategy

CO$_2$ Reduction

50% Kaizen

25% PE Technology

25% Renewables

448 - New Target (▲61%)

FY14 FY18 FY26 FY31 FY51
(Base year)
KAIZEN: CO2 Reduction Projects

Kaizens that our Team Members have implemented

201 kMT

50%
25%
25%

CA Pressure

Subject: Powertrain Compressed Air Supply Pressure

<table>
<thead>
<tr>
<th>Original Condition</th>
<th>Current Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher Pressure/Higher Energy Use</td>
<td>Lower Pressure/Energy Savings</td>
</tr>
</tbody>
</table>

Higher Pressure

- 80psi differential
- Machine (of machining process)
- Regulator
- Control valve
- User

Lower Pressure

- 65psi differential
- Machine (of machining process)
- Regulator
- Control valve
- Low

Estimated savings from implementation at one plant:

- CO2 Cost Savings: $ 235,242
- CO2 Reduction: 2304.1

Non-Production Usage

Reduce energy consumption during non-production time

- Fans, pumps, burners, air guns, etc. during non-production time

Shutting off equipment during non-production time - Energy Savings

HVAC Filters

Subject: HVAC Energy and Maintenance Costs

<table>
<thead>
<tr>
<th>Original Condition</th>
<th>Current Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front loading filters</td>
<td>Full filters</td>
</tr>
<tr>
<td>Frequent changes, high fan speed</td>
<td>Longer service, lower fan speed</td>
</tr>
</tbody>
</table>

One plant results:

<table>
<thead>
<tr>
<th>Item</th>
<th>Original</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual cost</td>
<td>104,000</td>
<td>60,000</td>
</tr>
<tr>
<td>Energy savings</td>
<td>10,000</td>
<td>50,000</td>
</tr>
</tbody>
</table>

VFD on Pump Motors

Subject: Nine Process Pumps Without VFDs

<table>
<thead>
<tr>
<th>Original Condition</th>
<th>Current Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>No control of pump output</td>
<td>Reduced pump discharge</td>
</tr>
</tbody>
</table>

- Energy Use
- Energy Savings

Pump speed at 60Hz, valve adjusted to restrict flow

Flow controlled by discharge valve

Control flow with VFD to reduce pump's energy consumption

Estimated savings for implementation at one plant:

- Cost Savings: $ 65,000.00
- CO2 Reduction: 636,649.09
Technology

100 kMT

25%

50%

25%

Design in CO2 Savings

2030 Target Plan

<table>
<thead>
<tr>
<th>FY14 Baseline</th>
<th>Kaizen Target</th>
<th>RE Target</th>
<th>PE Tech Target</th>
<th>Prod &amp; Process</th>
<th>2030 Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,150</td>
<td>201</td>
<td>101</td>
<td>100</td>
<td></td>
<td>747</td>
</tr>
</tbody>
</table>

1. Issue: CO2 increases or decreases due to Prod & Process

A. Recent Examples:

- TNGA (Casting) – CO2 +2%
  - Development (2020)
  - Volume ▲50%
  - CO2 reduction ▲30%
  - 23 M/C's

- Laser Screw Weld (LSW) – CO2 +3%
  - Side air
  - No Compressed air
  - Need Compressed Air
  - Current (Spot Welding)
  - 46 M/C's
Renewables – 2 Stage Approach

Toyota RE Strategy

15% On-Site
85% Off-Site

On-site Systems
- TMNA HQ – Plano, TX
- TMMBC
- TMMTX

Utility Co Power Purchase Agreements
- TVA
- AEP
- KU
- VECTREN

Virtual Power Purchase Agreements

CO2
101 kMT

85%
15%

Off-Site
On-Site
Toyota’s Impact in Texas

8.7 MW Sun Power System
More than 20,000 panels
33% Office Load

3.1 MW Sun Power System
More than 8,700 panels
1st Roof Top System on MFG Fac
• Toyota embraces being a sustainable leader

• Developed 6 challenges that touch our business from design to manufacture to end-of-life products

• Seeks opportunities to reduce environmental impact through Kaizen

Thank you