# -HEAT PUMP-

# Diffusion of the heat pump technology including air conditioning system in next generation

MAY 18,2016
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Technology and Innovation Center
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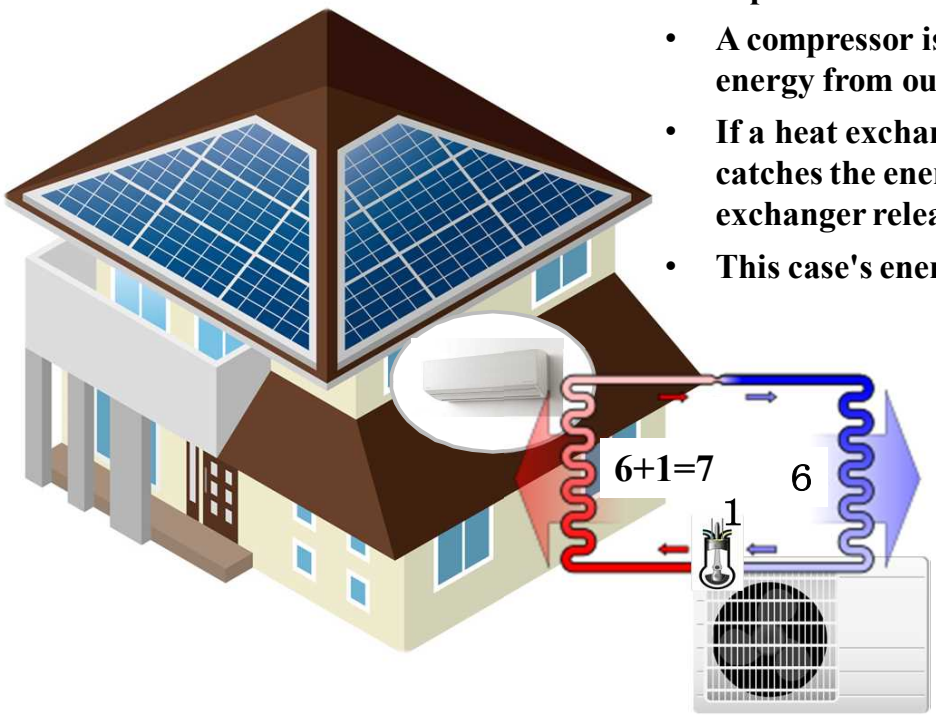
テクノロジー・イノベーションセンター

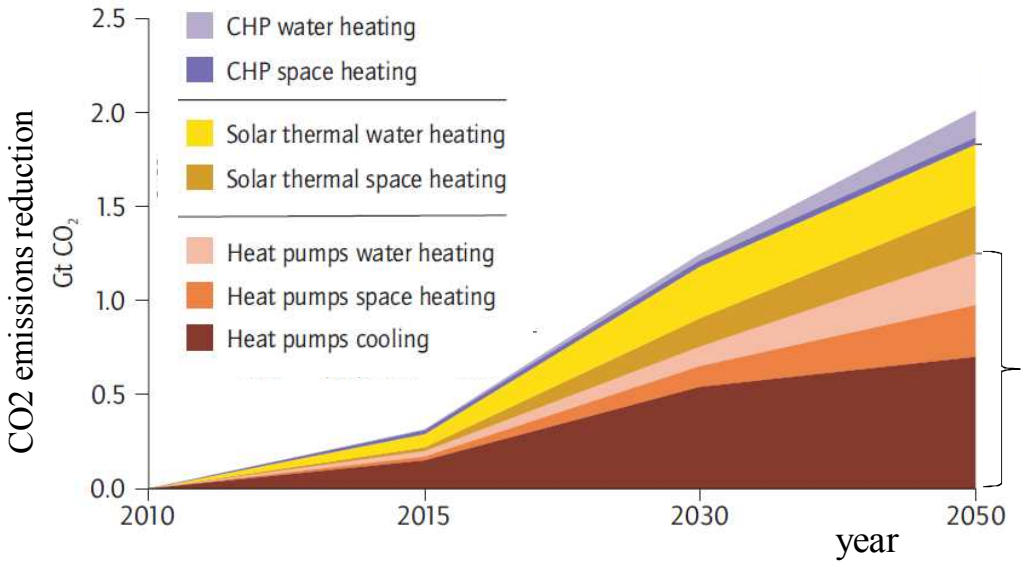
## Heat pump is the excellent technology for which an energy efficiencies is very high.




**Example of Air to Air Heat Pump**

- A compressor is just carrying the energy from outdoor air to indoor air
- If a heat exchanger in an outdoor unit catches the energy of 6, an interior heat exchanger releases the energy of 7
- This case's energy efficiency makes 7

# Heat pump contribution to CO2 emissions reduction




Heat pump save about 12.5Gt CO2 in 2050

**Reference：**

**Technology Roadmap (Energy-efficient Buildings: Heating and Cooling Equipment) , IEA (2011.5)**

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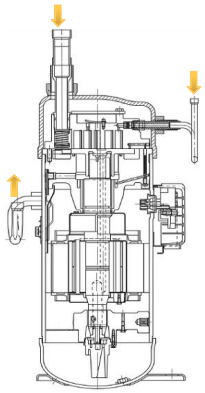
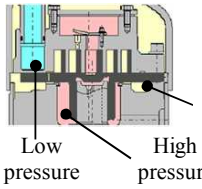
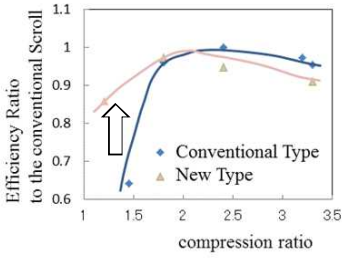
## Compressor

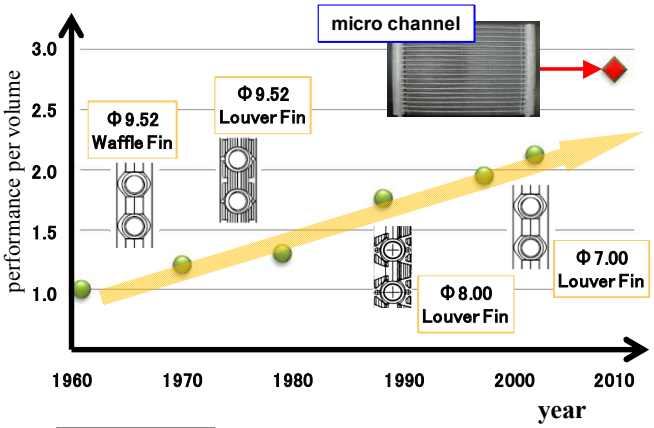




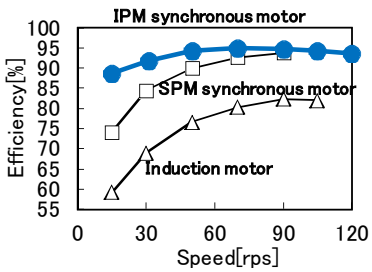

Forcing of orbiting scroll using middle pressure




## Heat exchanger



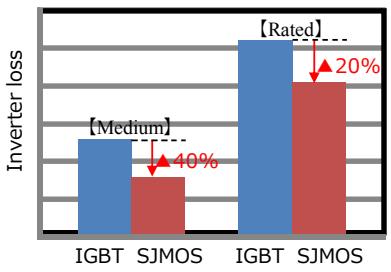

## Motor



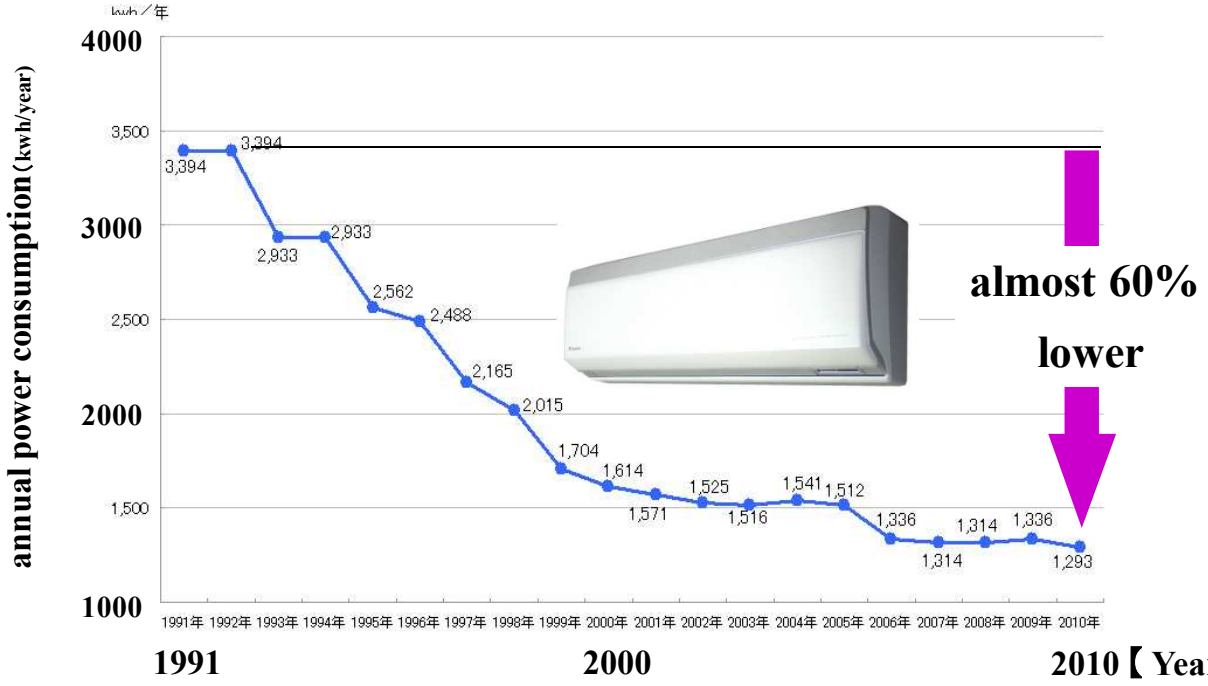

IPM synchronous motor

## Inverter

**Adoption of a new style switching device(for room air-conditioner)**



# Power consumption trend of the room air-conditioner
## (cooling capacity 4kw)

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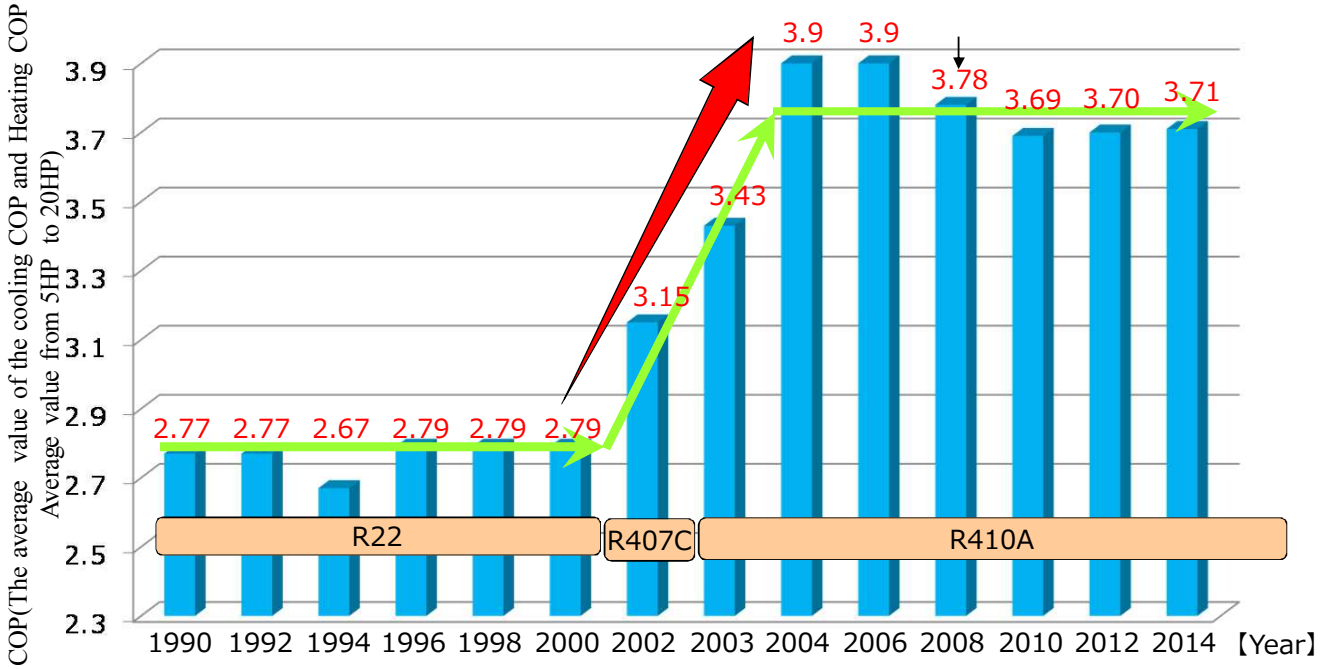
# COP trend of the VRV air-conditioner



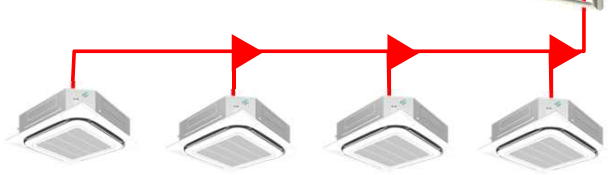
# For realization of ZEB

## THIC

## (Temperature Humidity Individual Control system)

**“Humidity control”**

**DESICA Humidity control Ventilation System**



**“Temperature control”**

**VRF operated by high evaporating temperature**

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## ■Desica Humidity control ventilation system

●Features

・High efficiency: About 2.5 times

・Downsizing: 1/3

・No required: supply water and drainage piping

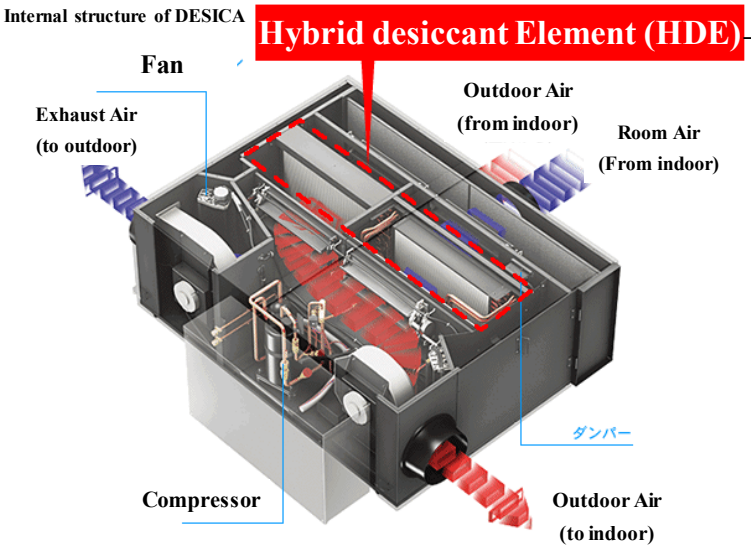
※compared to conventional desiccant dehumidifiers

・Adsorbent is Directly applied on the surface of the heat exchanger fins

・Low regeneration temperature (40 deg. C)

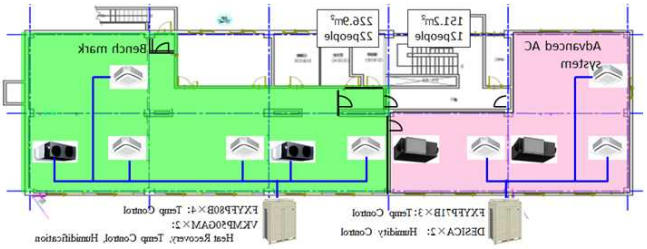
・Low heat loss,downsizing

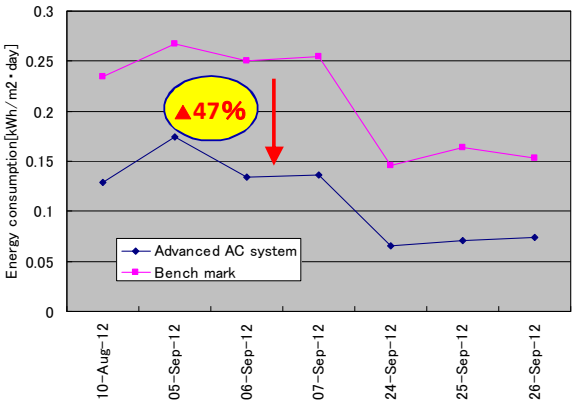
Internal structure of DESICA



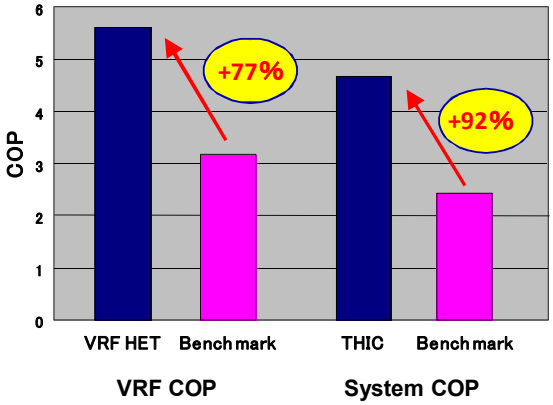

HDE fin　Normal fin

# ZEB demonstration at Nagoya University




***Comparison of power consumption***



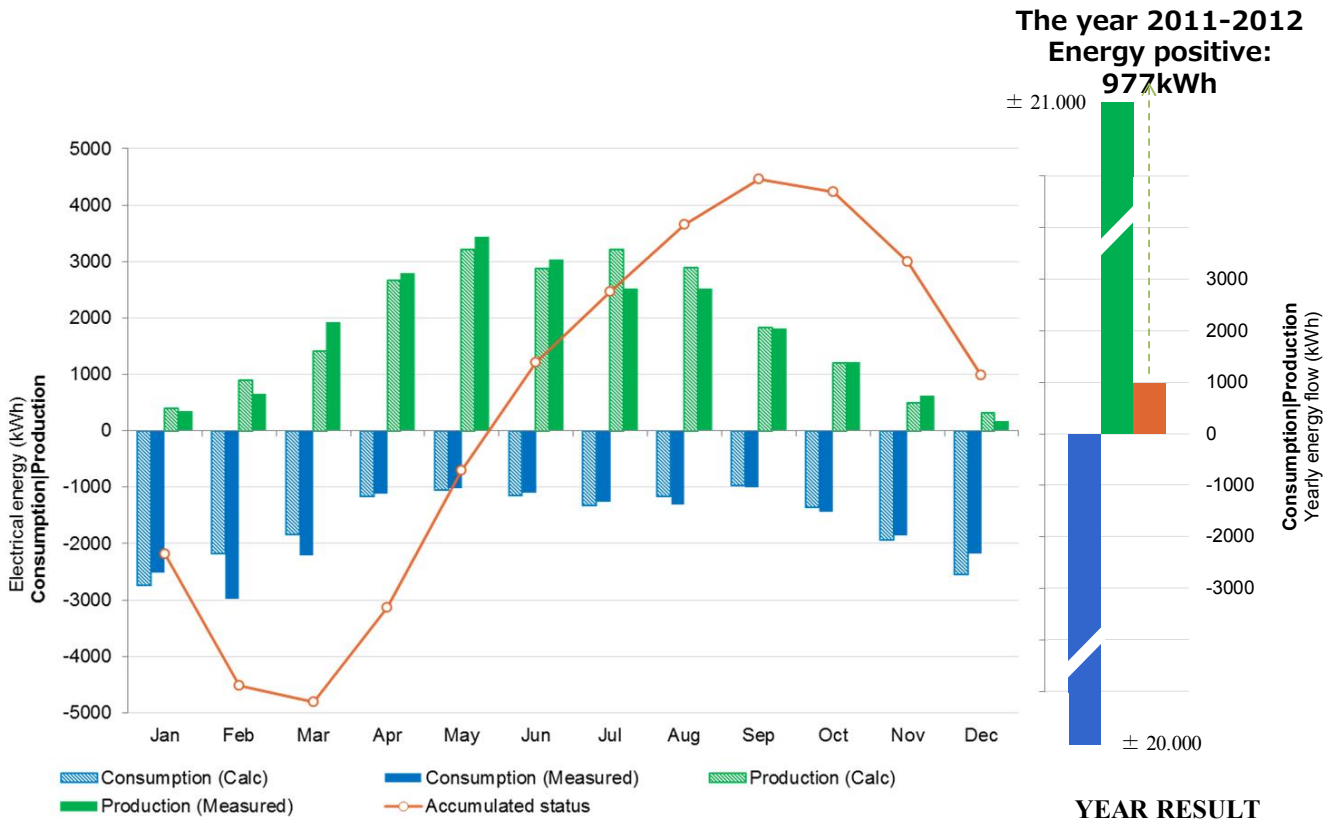

***Comparison of COP***



# ZEB demonstration in Germany


Location: Herten, Ruhr region, Germany

| | |
|---|---|
| **Heating** | **Daikin Altherma – Air to Water heat pump with floor heating** |
| | **VRV – Air to Air heat pump used for heating** |
| **Cooling** | **VRV – Air to Air heat pump Cooling + dehumidification in summer** |
| **Ventilation** | **VAM – heat recovery ventilation Sensible and latent heat recovery** |
| **Lighting** | **Use of LED-technology for night-lighting and spot-lighting** |
| **Power generation** | **Thin film Photovoltaic with 27,3 kWp** |
| **Energy-monitoring** | **Building management system** |

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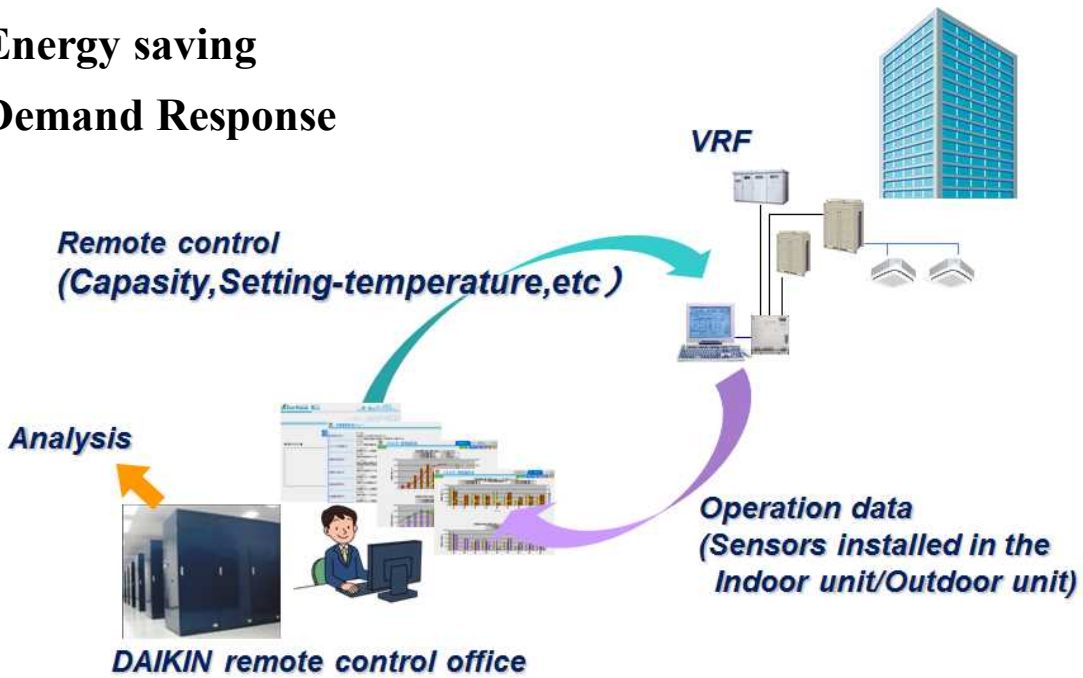
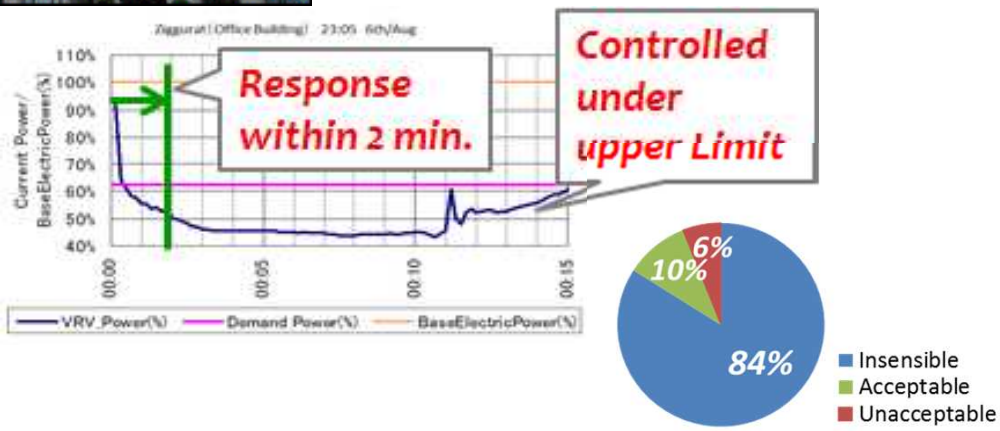
## Remote control Service

- Trouble diagnosis
- Energy saving
- Demand Response



# Demand Response Demonstration in UK

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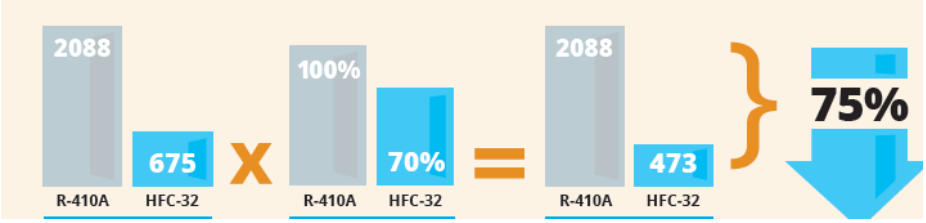
# Consideration regarding the GWP of Refregerant

**R32 is a refrigerant that addresses a range of environmental, safety and economic considerations :**

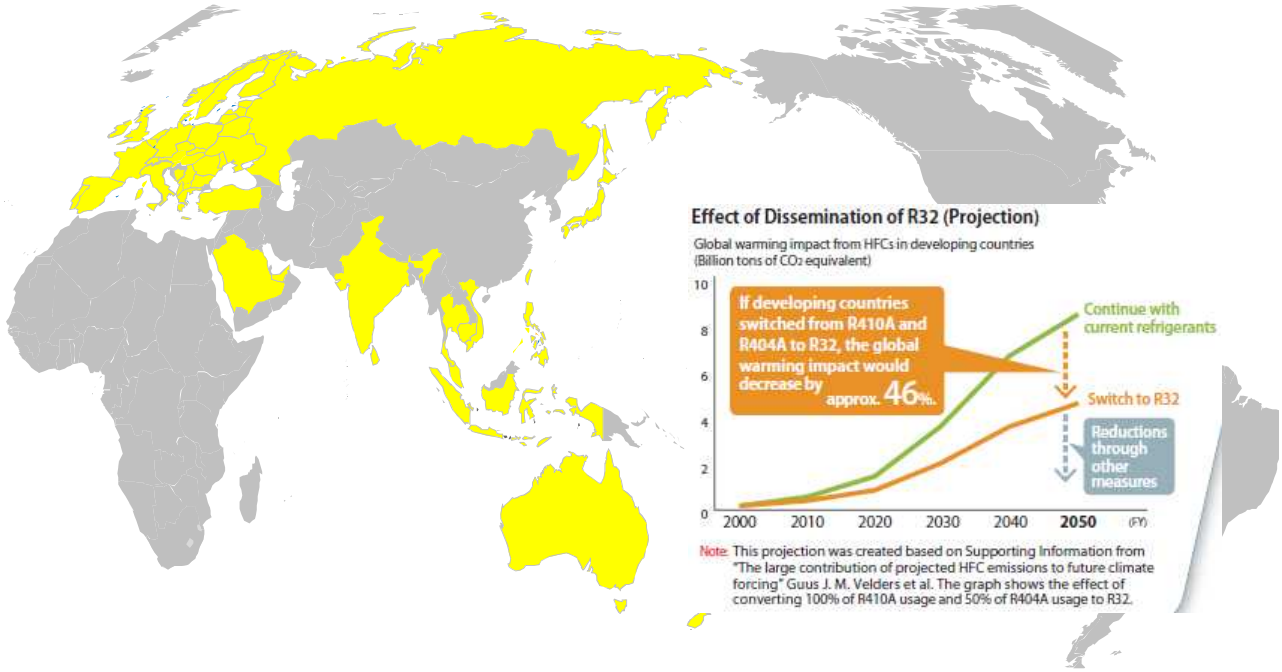
- **Zero Ozone depletion potential (ODP)**
- **Lower Global Warming Potential (GWP) – about one third of R410A**
- **R32 allows for reduced refrigerant charge, compact design and high energy efficiency**
- **Easier to charge, recover and reuse because it is not a blend**
- **Safe to use in many applications because it is an A2L classified refrigerant (low toxicity and lower flammability)**

**The potential global warming impact (GWP x kg) can be up to 75% less than that of R410A. Energy efficiency can also be improved by 5-10% depending on models.**




**Up to 75% lower global warming impact than R410A**

# 5.5 million units have already sold in 47 countries (2012~2015)

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# Thank you !

# Evolution of a residential fuel cell unit "ENE-FARM" and challenges for further penetration

May 18th, 2016

Toshiki Shimizu

Panasonic Corporation

# Contents

# Residential Fuel Cell “ENE-FARM”



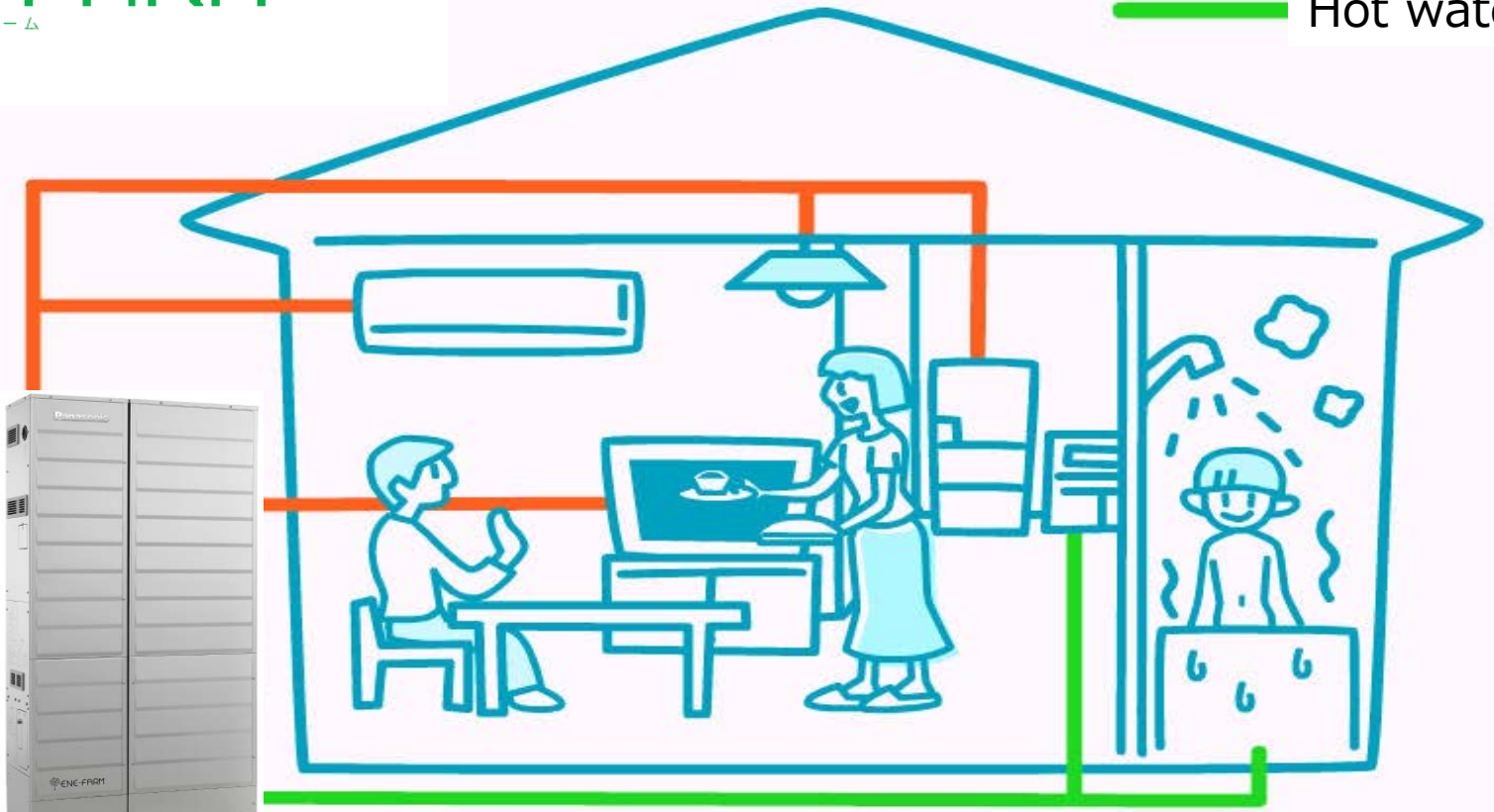
**Residential Fuel Cell “ENE-FARM” is a micro combined heat & power system “mCHP” which creates electricity and hot water by chemical reaction with hydrogen and Oxygen**

ENE·FARM
エネファーム

Electricity
Hot water

**$H_2$**
(Hydrogen)

**$O_2$**
(Oxygen)

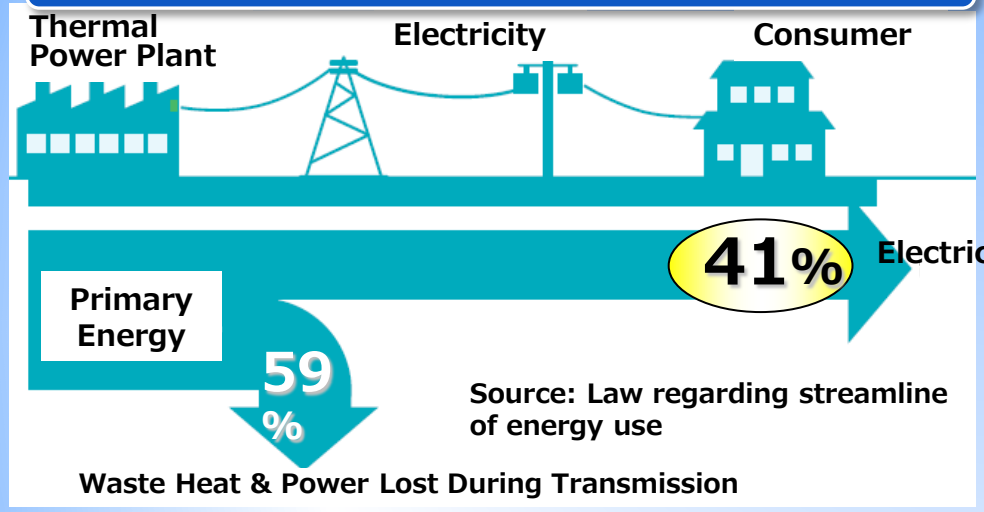


# Advantage of ENE-FARM

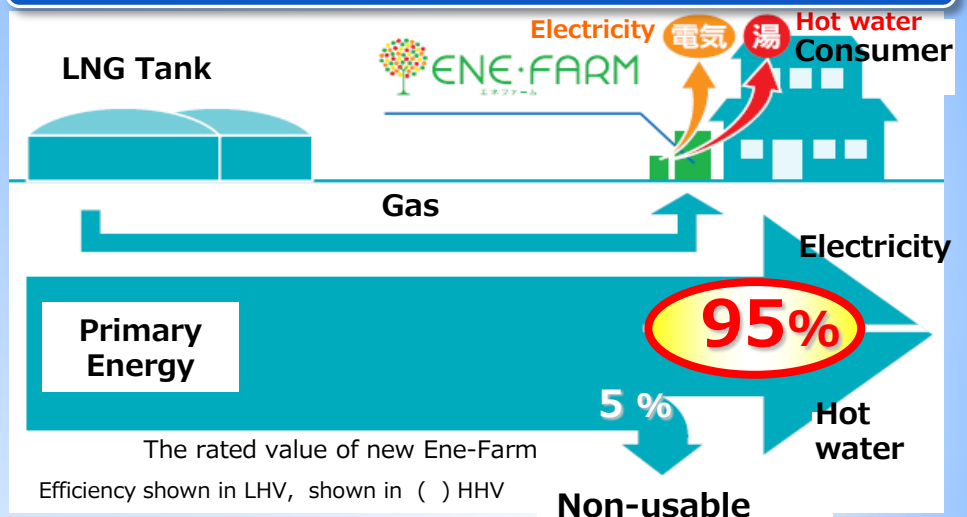


## ◆High Energy Efficiency

### Thermal Power Plant

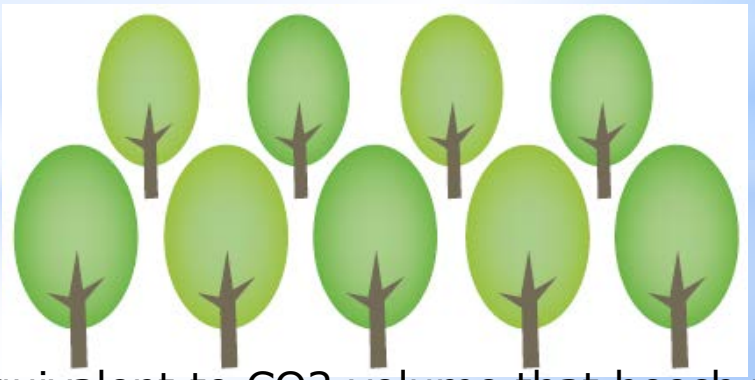



### ENE-FARM




## ◆ Reduction of CO2 emissions
## : 1.3t / year

## ◆ Energy cost saving
## : 60,000 yen / year



Equivalent to CO2 volume that beech tree forest of approx. 2,800㎡ in size absorb

*Data from Panasonic

# Development History of ENE-FARM



## ■ Developed the 4th generation model for market penetration

1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016

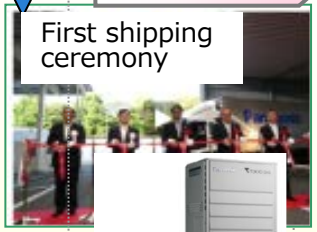
**Panasonic**

- Basic technology development
- Development for practical use
- Development for Commercialization
- Large-scale field test
- Commercial sales
  - Introduction
  - Enlarged Introduction
  - Penetration

Installation at Prime Minister official residence

Opening of Kusatsu Factory

First shipping ceremony

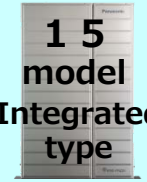


0 9 model

1 1 model

1 3 model + Apartment type

1 5 model Integrated type



Boiler Separated type

Apartment type (new)

**Government**

- NEDO Practical-use Experiments Penetration research project
- NEDO Strategically practical technology development
- NEF Experimental field research
- NEF Large-scale field test project

(**NEDO**: New Energy and Industrial Technology Development Organization)
(**NEF**: New Energy Foundation)

**Industries**

- FCCJ (Fuel Cell Commercialization Conference of Japan)
- FCA (Fuel Cell Association)
- ACEJ Advanced Cogeneration & Energy Utilization Center Japan

Promote initiatives with the government & related industries

# 2015 model for Detached house



- Two types installation (Boiler integration/Boiler separation)
- Built-in system of continuous power generation at blackout

## Installed example for detached house

Fuel Cell Unit

Boiler + Storage tank Unit

Remote controller

## Features

### Fuel Cell Unit

- Power Generation 700w – 200w
- Heat Generation 1000w
- Overall Efficiency 95.0%
  (Electricity 39%+Heat 56%)
- Durability 70,000 hours
- Dimension 1750(H) x 400(W) x 400(D)
- Weight 77kg

### Hot water Storage tank Unit

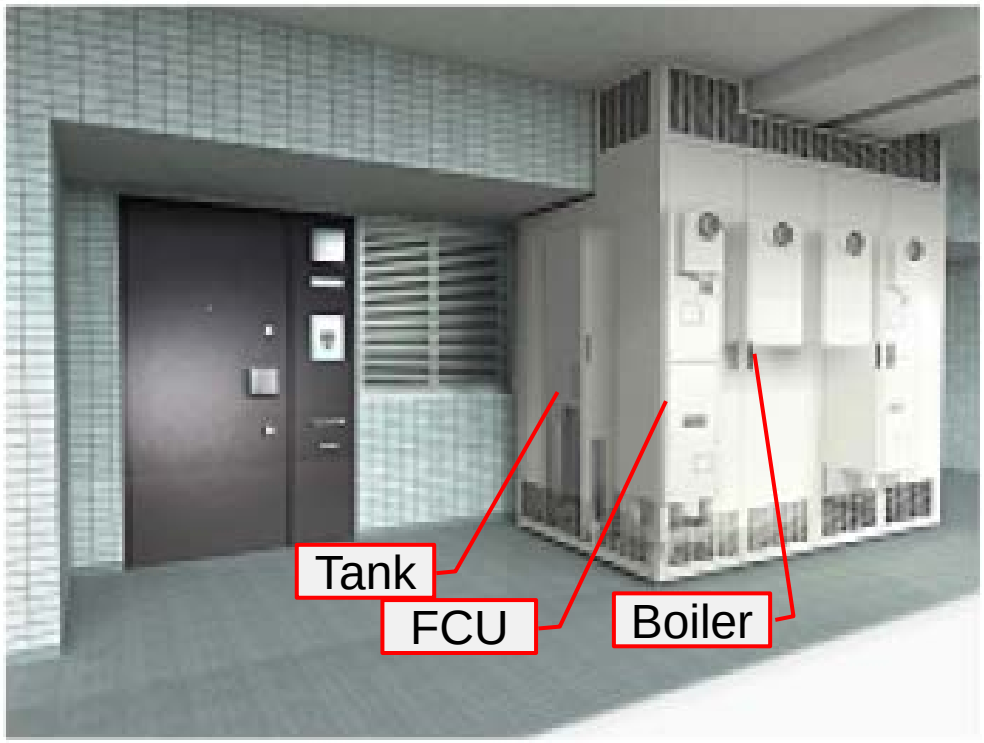
- Back up boiler output 41.9kw
- Water tank capacity 140L
- Dimension 1750(H) x 700(W) x 400(D)
- Weight 88kg(dry condition)

# Adoption for Apartment



- New Model for Apartment will be launched in July 2016
- Two types installation (Standard/Exhaust Extension)
- Built-in system of continuous power generation at blackout

## Installed example for apartment house




## Features

### Installation in pipe shaft space

- Improvement of airtightness by thick outer panel
- Integration into one location for several exhaust vent

### Specialization for apartment

- Earthquake resistance
- Resistance to wind

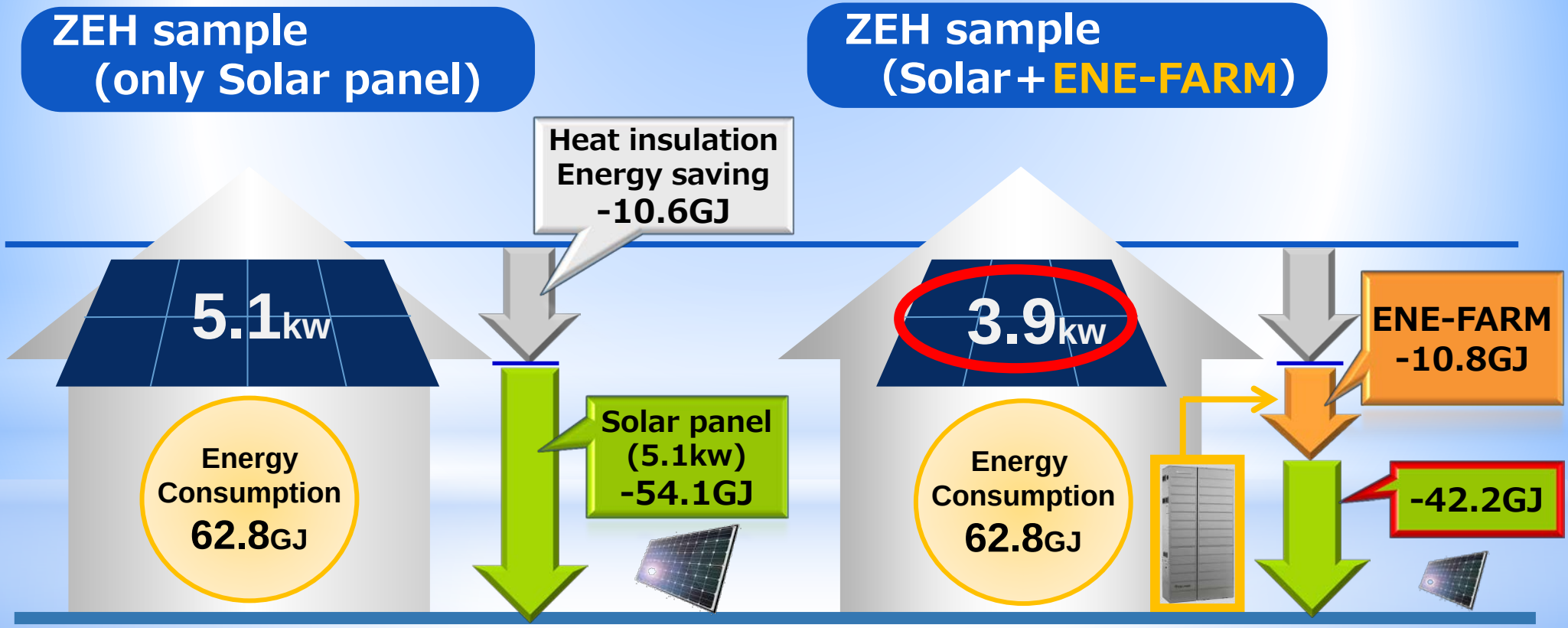
### Wide variation of installation

- Exhaust variations
- Compact size boiler
- Installation into separated pipe shaft

# Activity for “ZEH”(Net Zero Energy House)



- Contribute to reduce the primary energy by ENE-FARM
- Contribute to realize “ZEH” for residential house in urban area which has limited roof space for necessary solar panel capacity



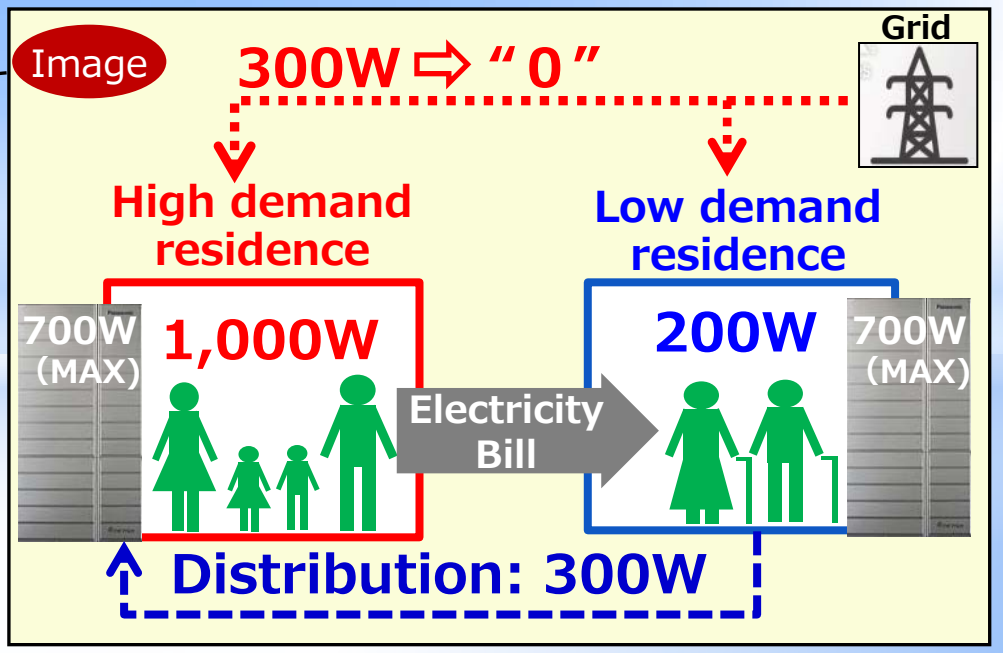

（estimation by Panasonic）

# Application for ENE-FARM : T-Grid System(*1)



- Micro Grid network within a apartment (190 homes)
- Minimize dependence on electric grid and reduce energy cost for residents
- A key technology for Virtual Power Plant

- ENE-FARM will be installed into all 190 homes.
- Each ENE-FARM will be optimized its operational load so that the total power generation will meet the total power demand.
- Only peak power shortage will be dependent on the existing grid.

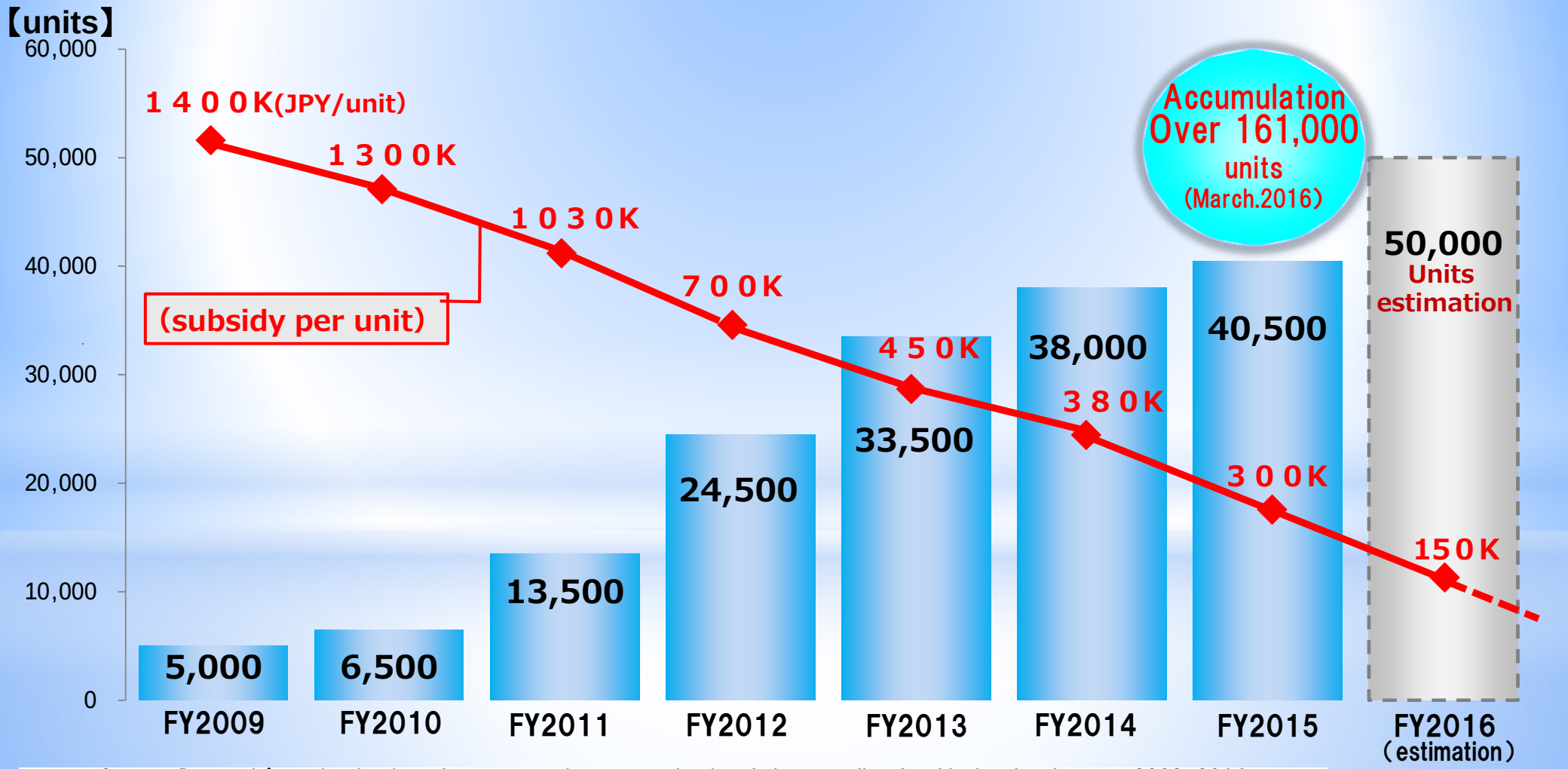




Source : TORAY Construction Co., ltd, SHIZUOKA Gas Company (*1) Micro grid system, T= Town, Team, Trust and Trade

# Market expansion in Japan



- Market is growing rapidly since 2009
- Accumulated quantity achieved over 161,000 units in March. 2016
- Cost reduction should be needed because of decreasing the amount of subsidy




Source : Panasonic's estimation from the summary of co-generation foundation regarding the shipping data between 2009-2014

Panasonic

# Joint Development with Viessmann



- Panasonic has entered into partnership with Viessmann company
- Viessmann and Panasonic developed 1st European Fuel Cell system Vitovalor 300-p launched in April, 2014※

VIESMANN

Vitovalor 300-P

Panasonic

Viessmann offers the right system solution with heat sources and has well organized sales and customer service system with enough experience in the European market

Panasonic has estblished relaiblity of Fuel Cell business by sales result and technical experiance more than seven years as a pioneer of fuel cell system in the Japanese market

※As of 9th of SEP 2013,residentia PEFC type Fuel Cell system by Panasonic estimation

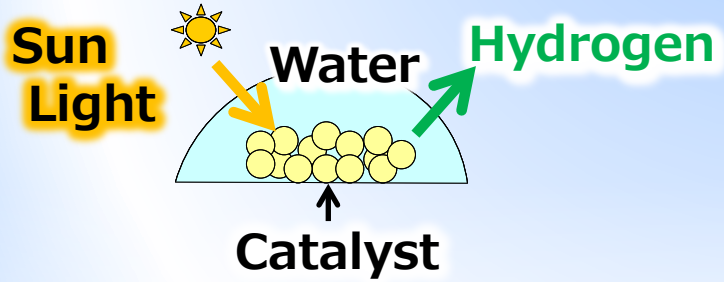
# Activity for Hydrogen Society



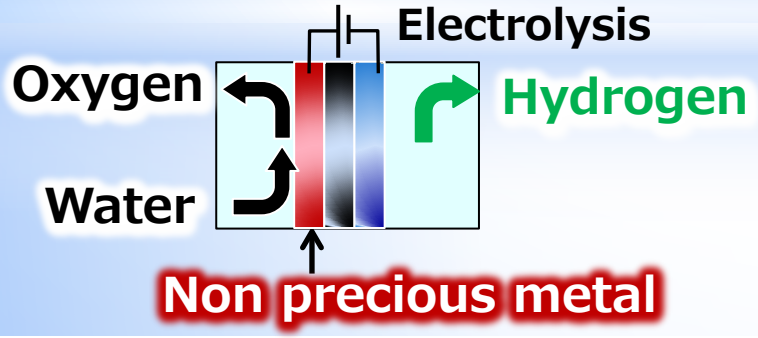
- Acceleration of development for entire value chain such as hydrogen production, storage and application
- Challenge to low cost production of hydrogen and breakthrough of storage technology with low cost and high density

## Production of Hydrogen

- Water resolution direct from the sun light




- Water electrolysis with high efficient non precious metal




## Application of Hydrogen

- Pure Hydrogen Fuel Cell

**Target Specification**

- Power :5kw
- Target Efficiency of Power generation : over 57% (Best in the world)
- Plural FC units connection

# Establishment of the Hydrogen Society



## ■ Toward the ultimate clean “Hydrogen Society” based on evolution of ENE-FARM and Carbon-Free Hydrogen

2000 2010 2020 2030 2040 2050

Evolution of Gas infrastructure Natural Gas ⇨ Hydrogen Infrastructure

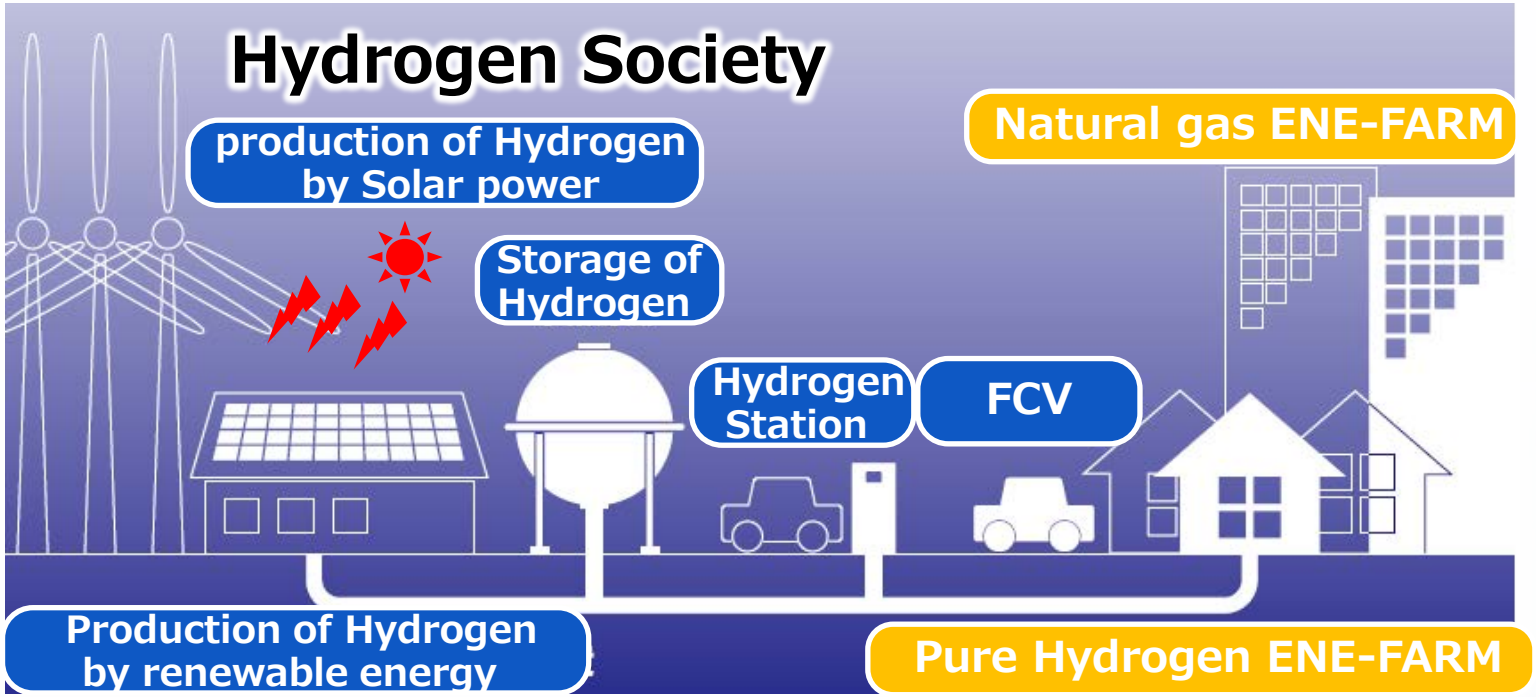
Tokyo Olympic

Spread and evolution of Stationary ENE-FARM

Introduction ⇨ spread and evolution of “FCV”

Establishment of “Hydrogen Station”

Hydrogen Society



**Panasonic will contribute comfortable life**
**for the customer and the global environment**
**by the spread and expansion of Fuel Cell**

A Better Life,
A Better World

# Fuel Cell Vehicle MIRAI's Development story & Fascination

May. 18, 2016

Hitoshi Nomasa, Project Manager, MS Product Planning
Toyota Motor Corporation





## Toyota's Work on Environmental Technology Development

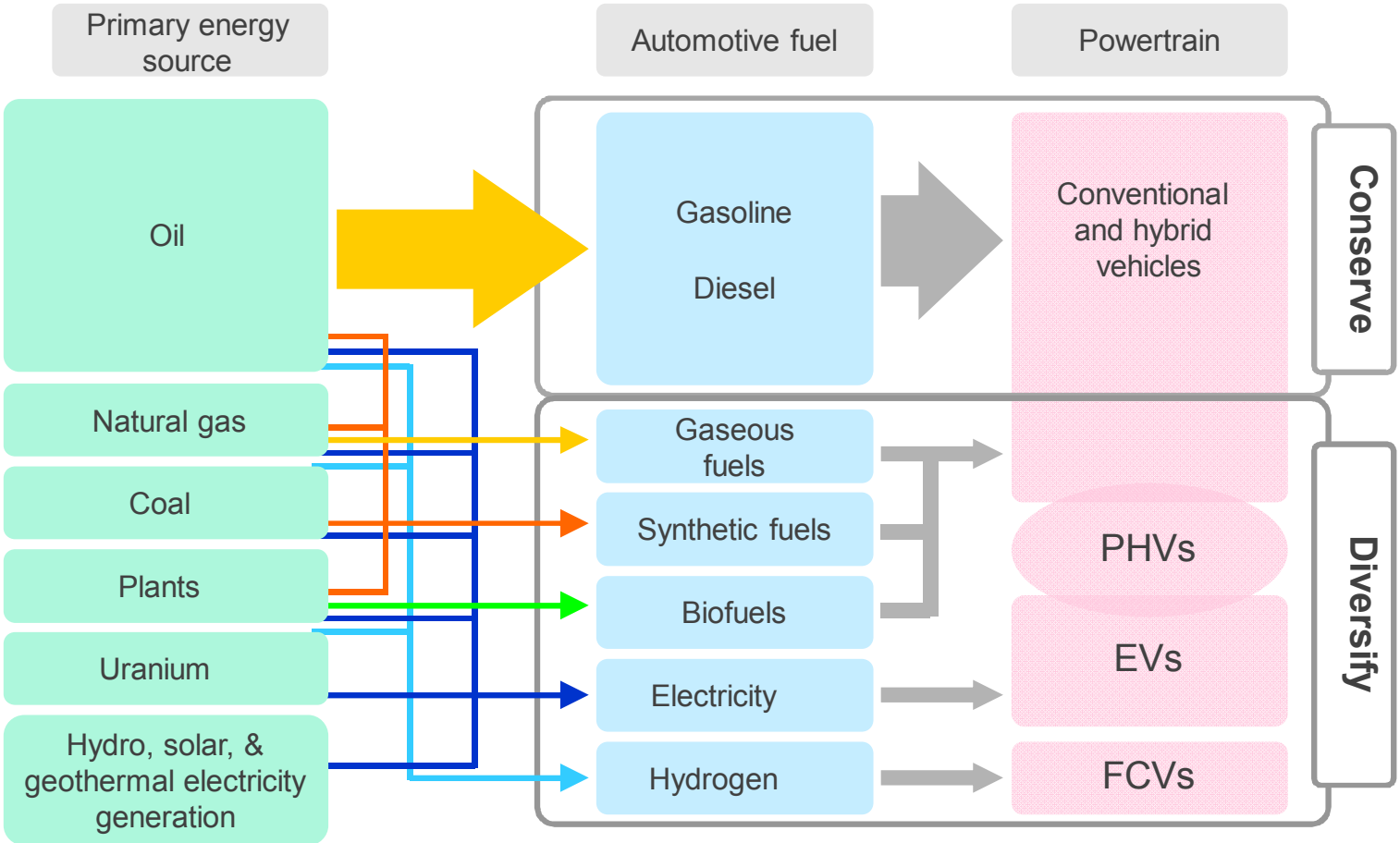
**Energy conservation**

**Fuel diversification**

**Eco-friendly cars contribute to environmental protection when they are widely used**







# Alternative Fuel - Hydrogen





## Advantages of Hydrogen

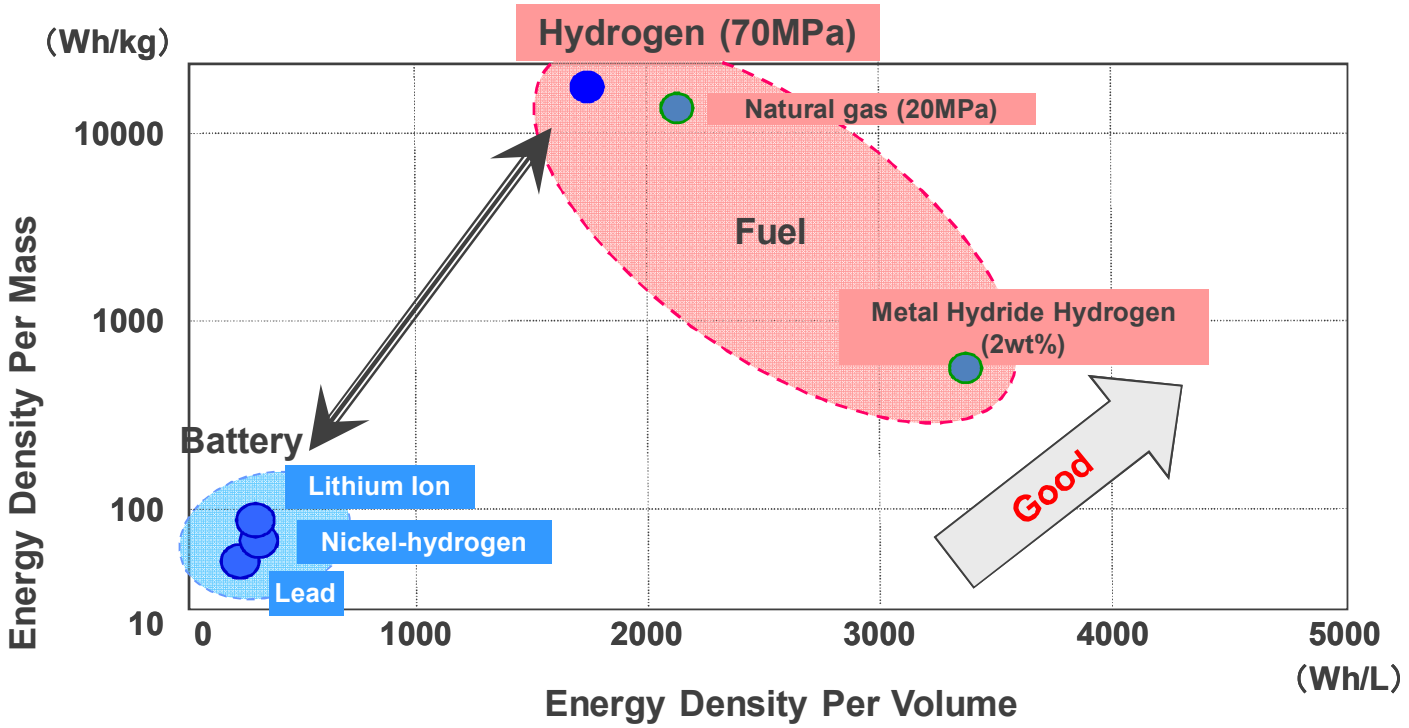
Zero $CO_2$ emissions during use
⇒ Helps with the creation of a low-carbon society

Can be obtained from a variety of primary energy sources
- It can be made from fossil fuels such as natural gas, as well as from sewage sludge
- It can be made from water using natural energy sources such as solar or wind energy

Has a greater energy density than electricity, and is easy to transport and store
⇒ It can be used to resolve uneven distribution of regional energy, and to compensate for fluctuations in supply from renewable energy sources

Can be used for a wide range of purposes
⇒Potential in everything from home use to automobile fuel and power generation

## Comparison of Energy Density




Toyota calculation

**The energy density of hydrogen is 7 times more than battery in common use**





## Positioning of Hydrogen

Hydrogen supports
a sustainable mobility society

"A leading energy source of
the future"

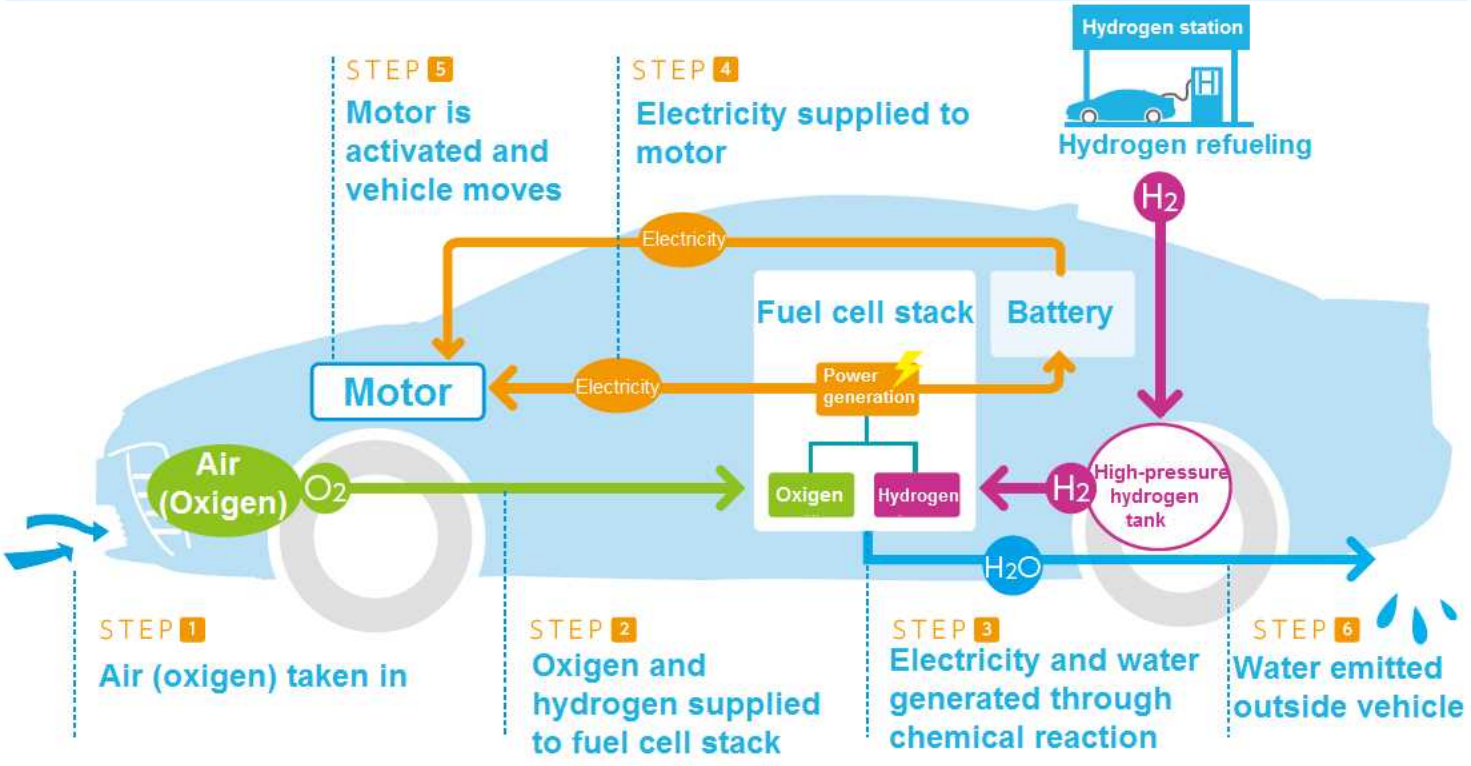
# Toyota MIRAI





## FCV's Mechanism

**Run a motor with electricity generated by chemical reaction between hydrogen from a tank mounted on a vehicle and oxygen in the air to drive a car (Clean mechanism without gas emission)**



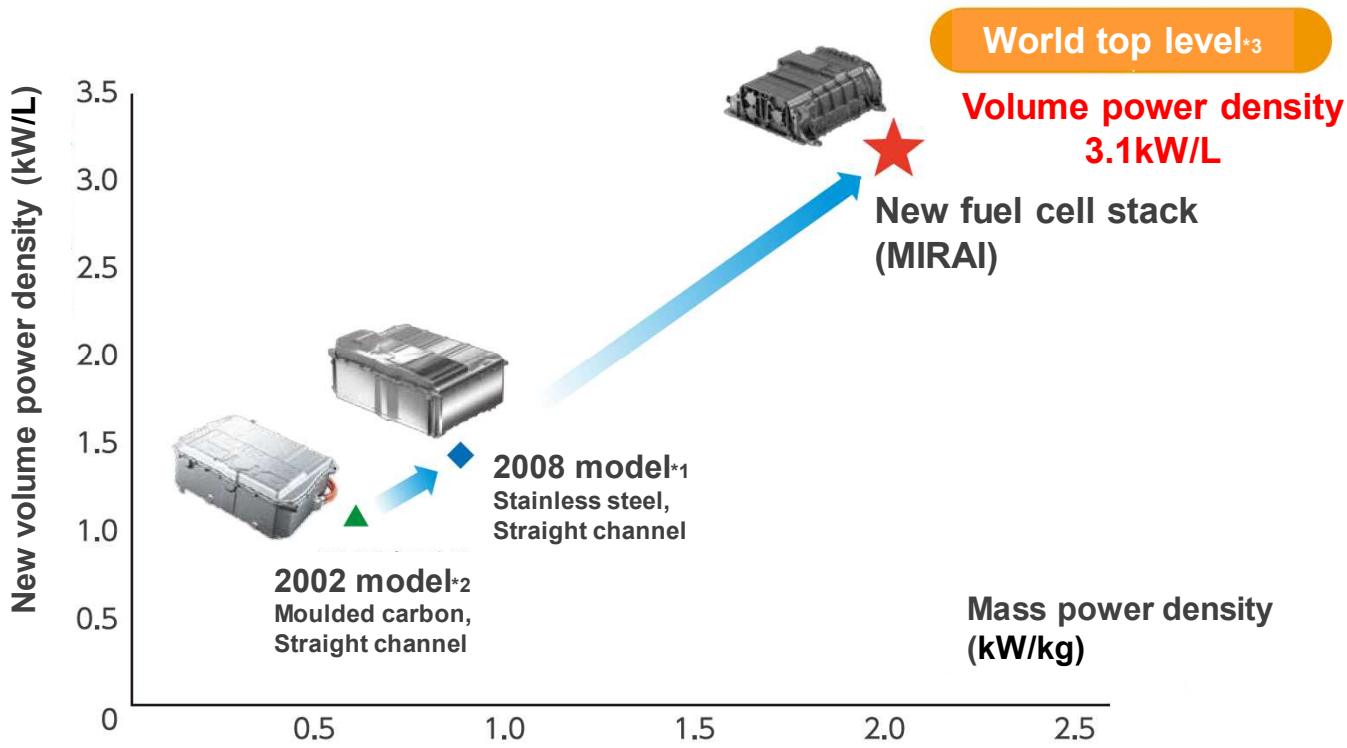
# Newly-developed Toyota Fuel Cell system





## Toyota Fuel Cell Stack

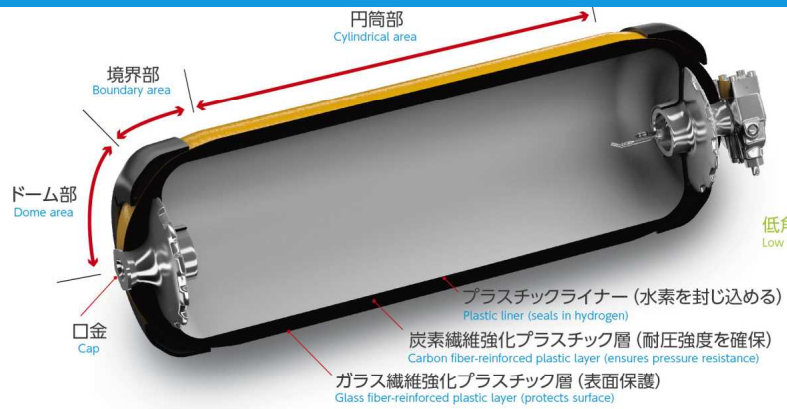
**New fuel cell stack with increased power density (enhanced performance, downsized)**




**Improved fuel cell performance and downsizing was realized**

# High Pressure Hydrogen Tanks

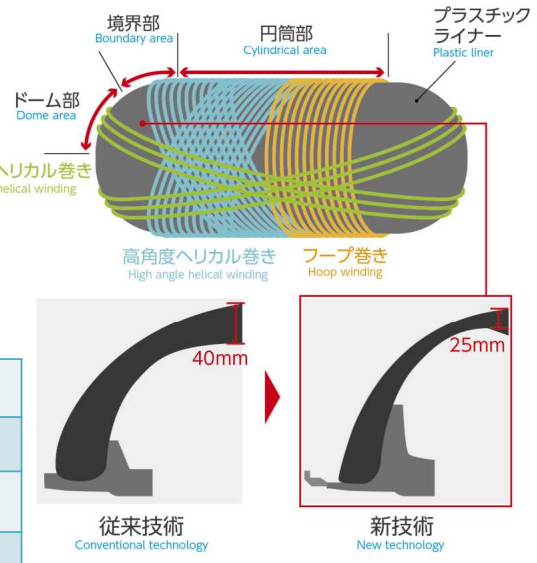
**Lighter weight achieved through innovations of carbon fiber reinforced plastic layer structure. World top level*2 tank storage density of 5.7wt% realized**




| | |
|---|---|
| Nominal working pressure | 70MPa (approx. 700 bar) |
| Tank storage density | 5.7wt% (world top level*2) |
| Tank internal volume | 122.4L (front tank: 60.0L, Rear tank: 62.4L) |
| Hydrogen storage mass | Approx. 5.0kg |

世界トップレベル*2
World top level*2

Innovation to the plastic liner configuration and efficient layering pattern resulted in a reduction of approximately 40% in the amount of carbon fiber used



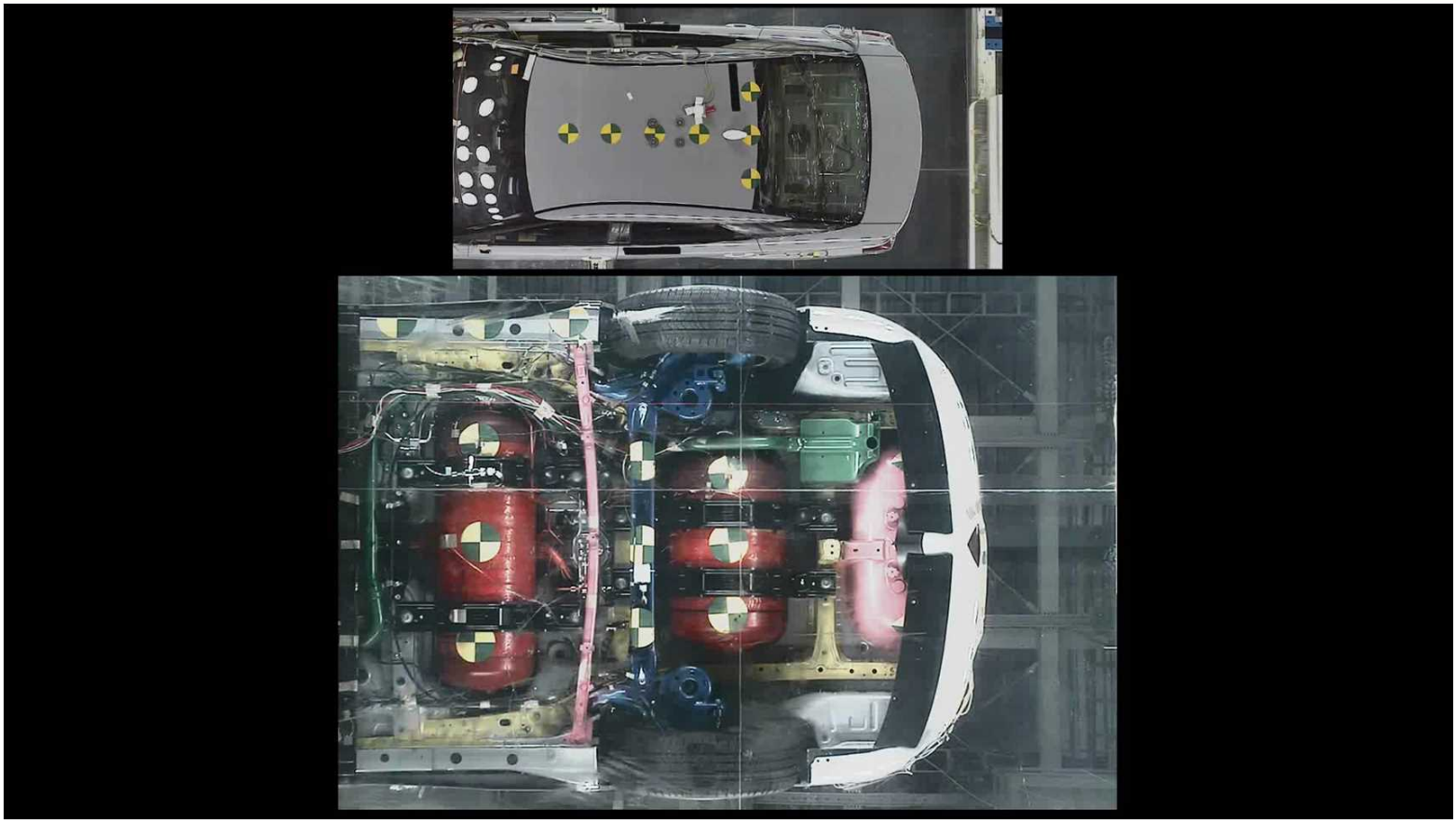

*2：2014年11月現在　トヨタ調べ　*2 As of November 2014, Toyota measurements

**Realized improved performance of the high pressure hydrogen tank and cost reduction**

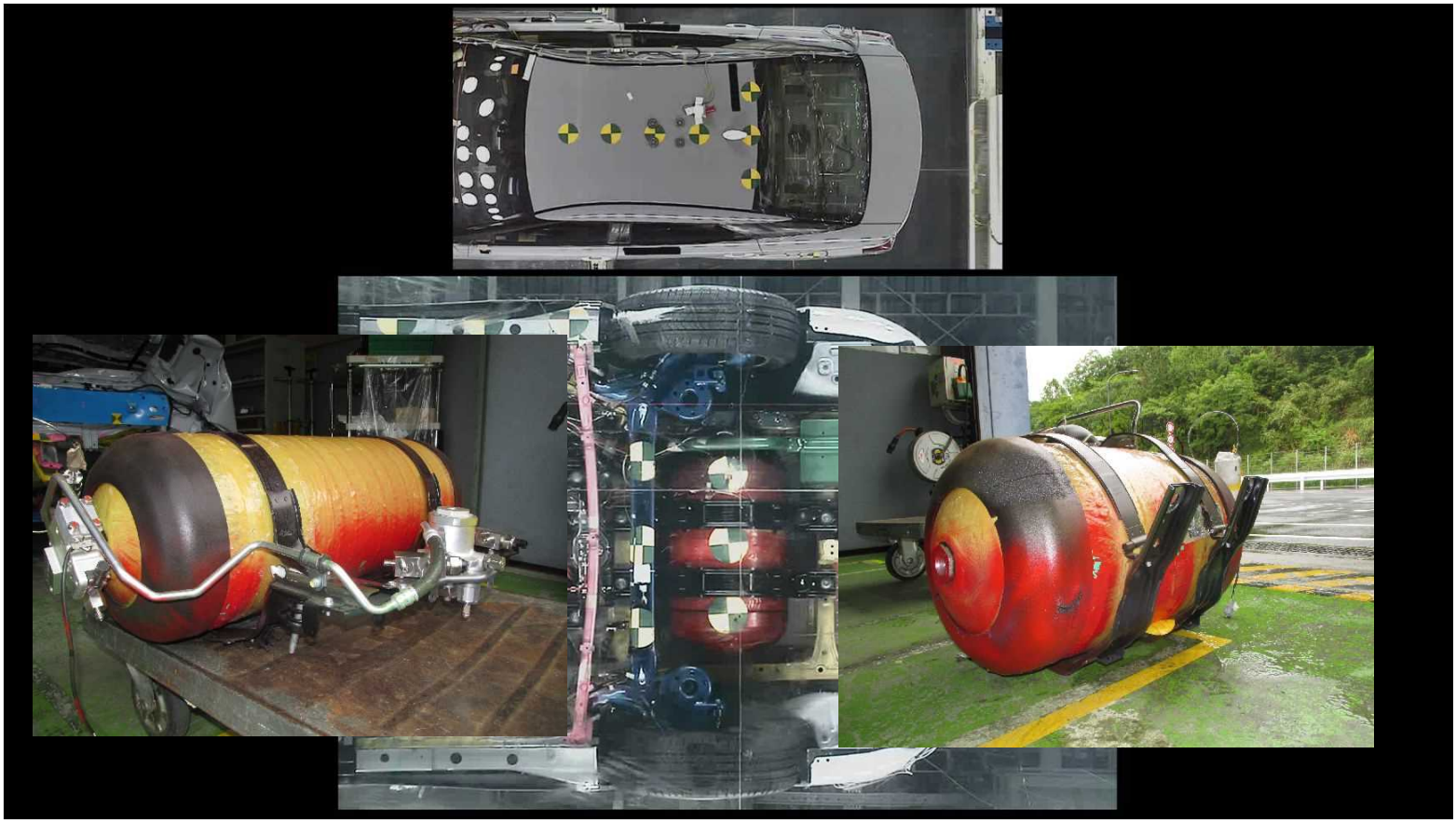




# Rear End Collision Test (80km/h)



# Rear End Collision Test (80km/h)







## Hydrogen fueling time: About three minutes

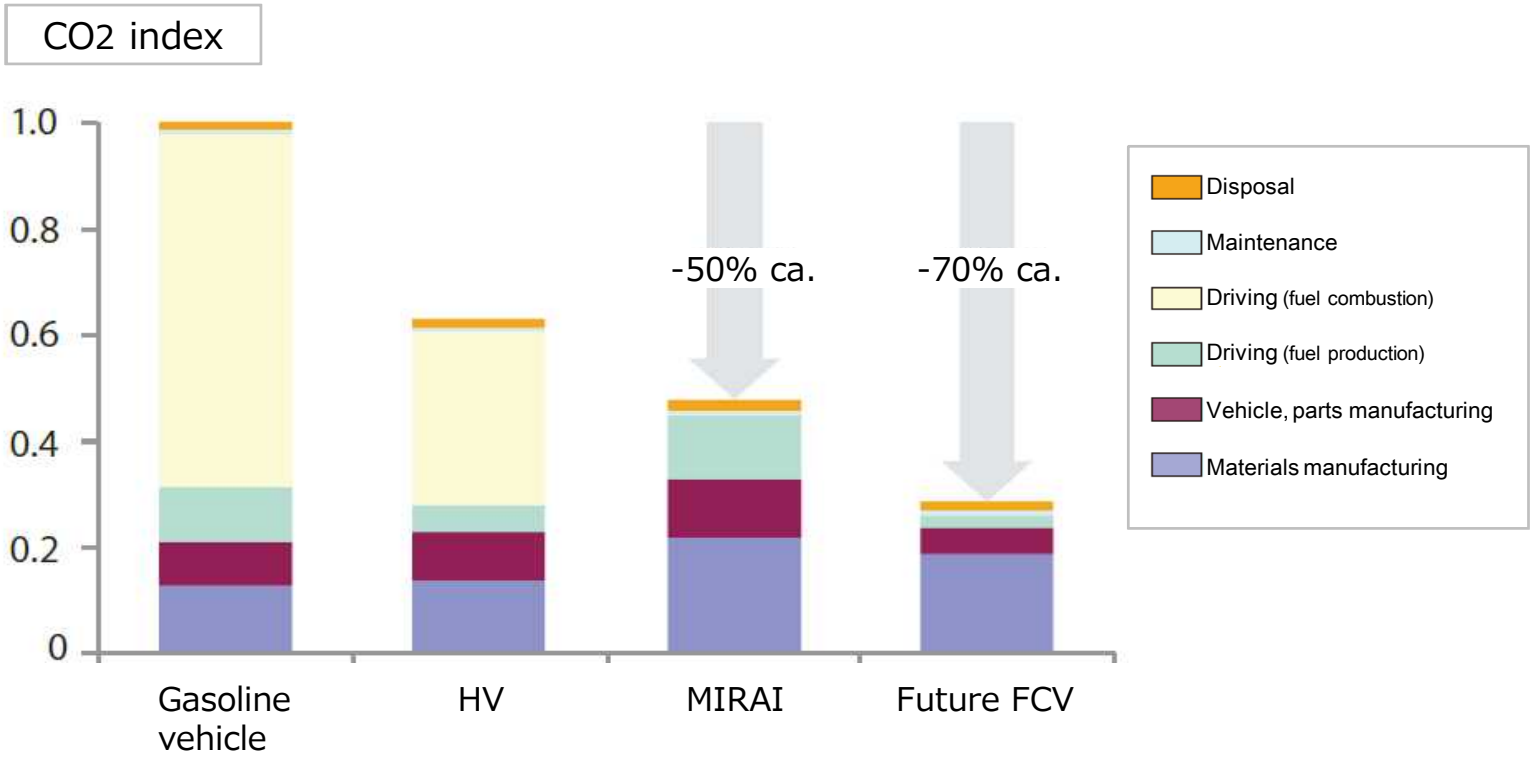
## Cruising range: Approx. 650 km

**(JC08 Japanese test cycle: According to Toyota measurements)**

**Approx. 700 km with the new standard stations scheduled for update from FY2016 onward**

**Short fueling time and long cruising range:**
**User-friendliness equivalent to gasoline-engine vehicles**

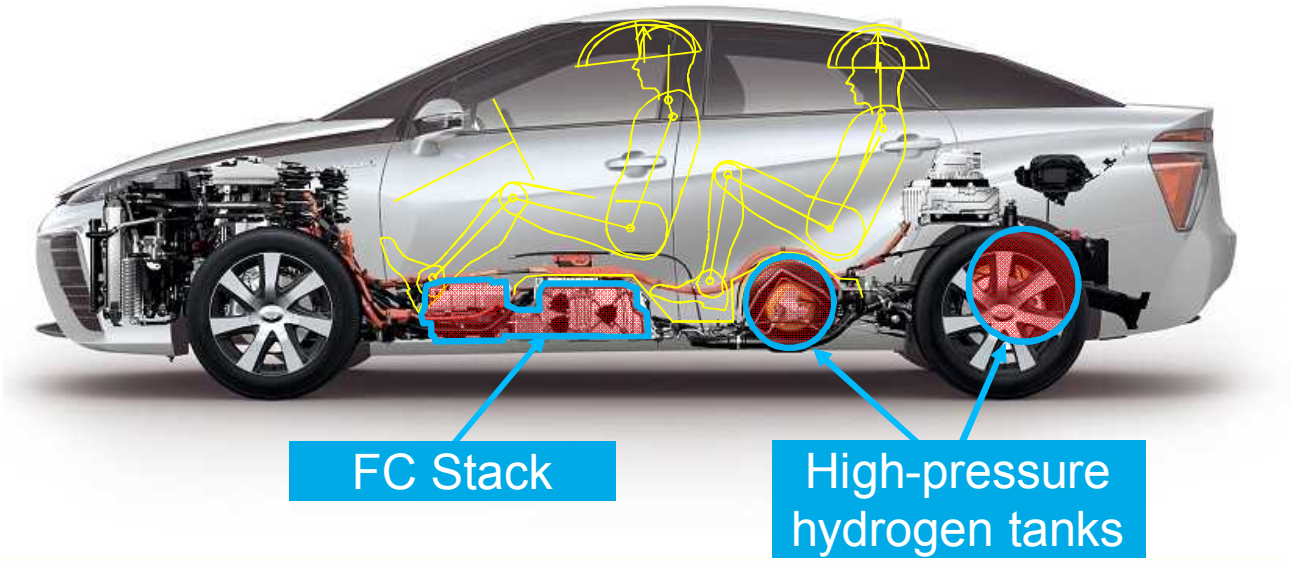
– Aiming for reducing total vehicle lifecycle impacts on the environment in addition to during travelling






# Fuel Cell Vehicles are Uniquely Fun to Drive

# Low Center of Gravity, Good Front/Rear Balance

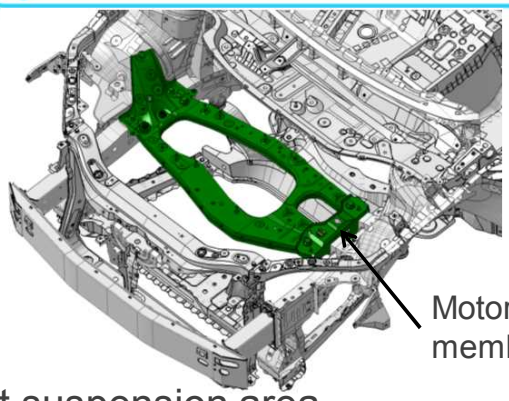



**Realized a low center of gravity and good front/rear balance by equipping the FC unit below the floor**

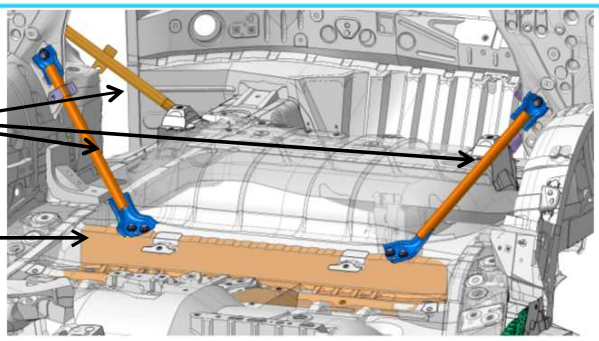




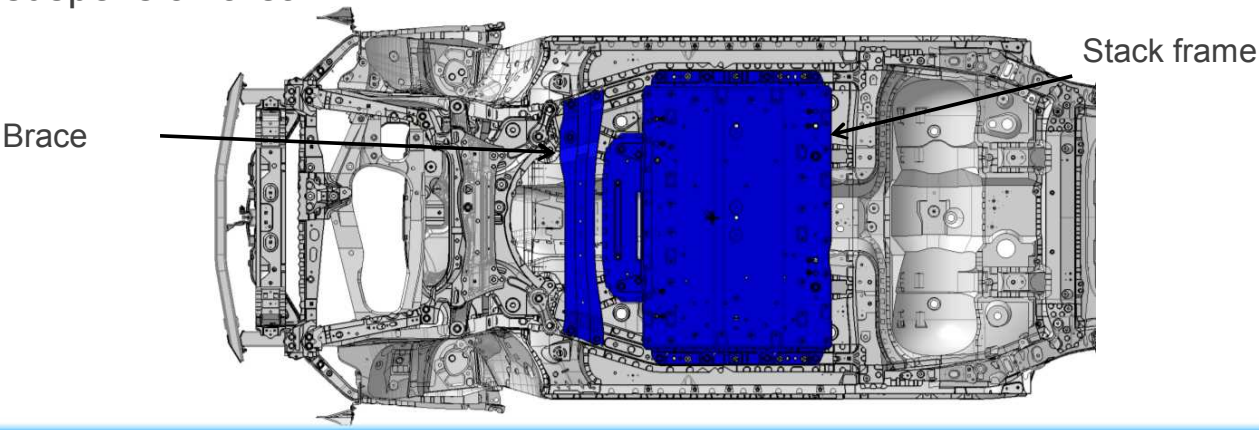
# High Rigidity Body



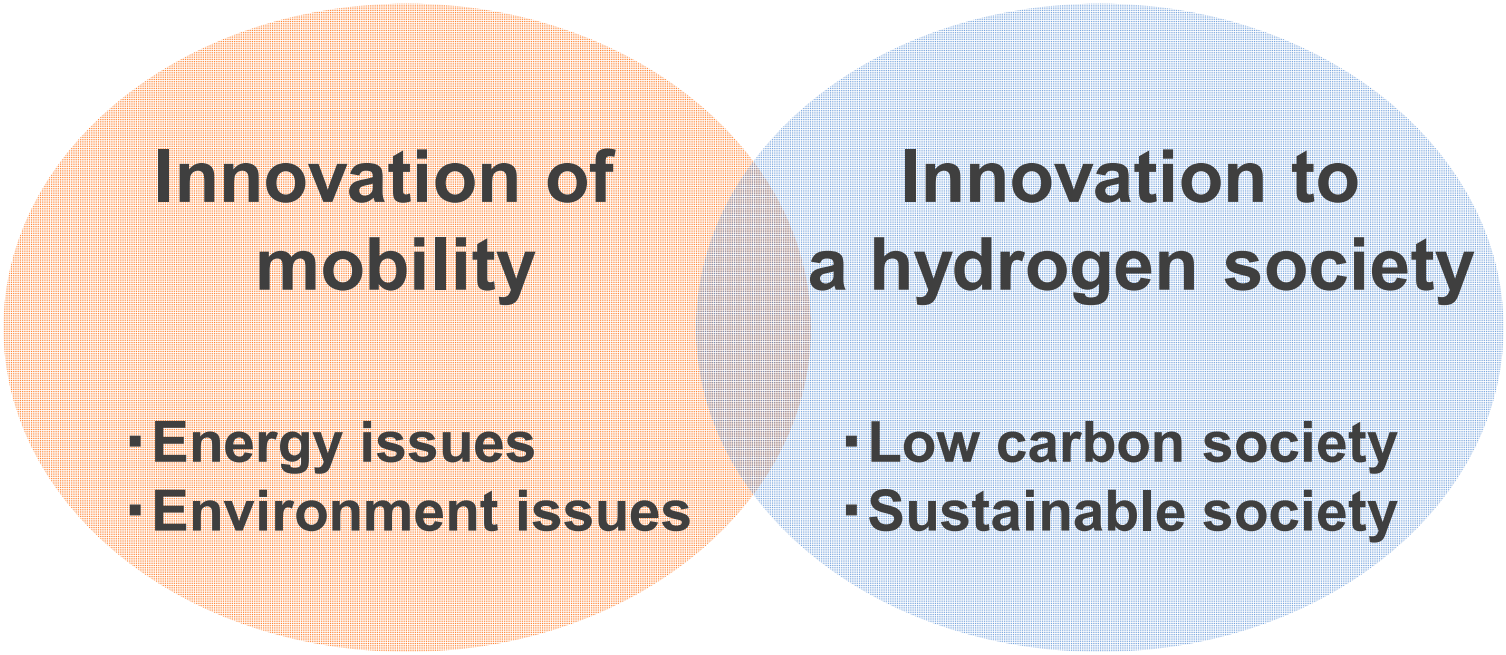

Front suspension area




Rear suspension area




**Torsional rigidity of 40%-60% higher than other Toyota front-engine front-drive vehicles**




**Proposal and challenges towards the future mobility society**
**Make “New values” become “Standard values”**





TOYOTA

Thank you for your cooperation


Germany – Japan International Symposium, May 18th, 2016

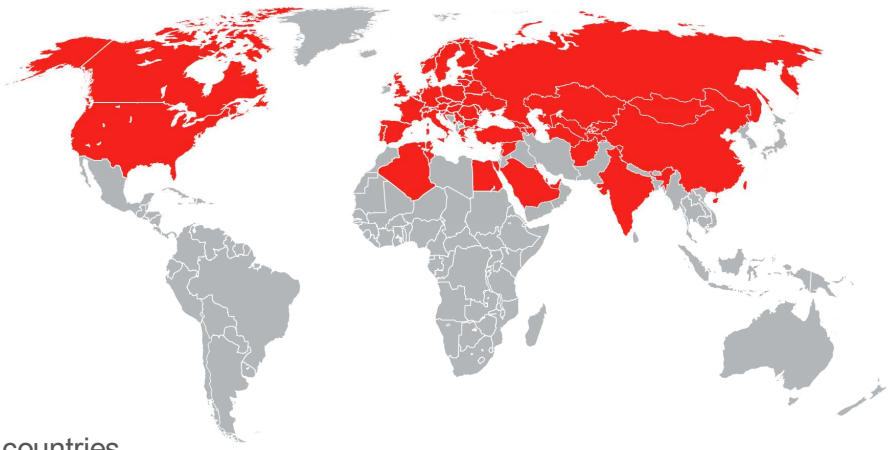
# The first Fuel-cell-based Micro-CHP in Europe

## A successful Japan – German Partnership

Walter Bornscheuer
Viessmann Group

## The Viessmann Group

Family business with head office in Germany

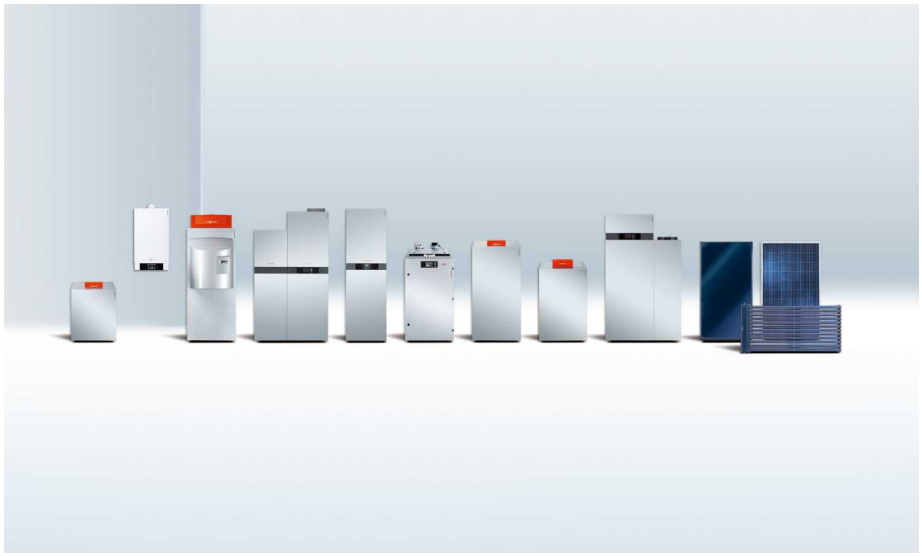


Countries with their own sales companies or partners

| | |
|---|---|
| 1917 | Founded |
| 11,500 | Employees |
| 2.2 | Turnover in billion € |
| 22 | Manufacturing sites in 11 countries |
| 58 | Countries with Viessmann Sales Presence |
| 120 | Sales offices worldwide |
| 56 | % International Sales |

## Heating systems

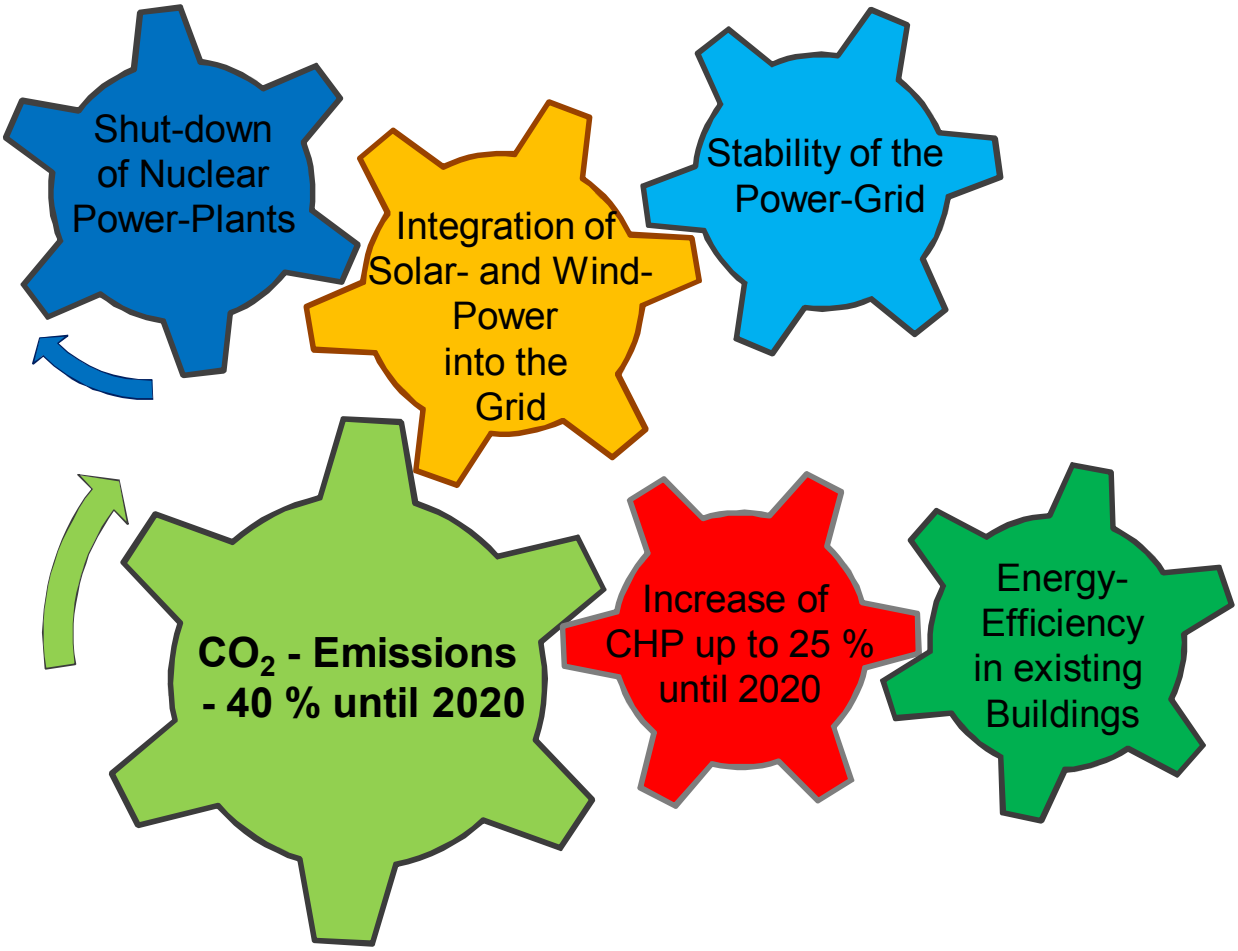
Efficient technologies for residential buildings and commerce from 1 to 2.200 kW



- Gas and oil condensing boilers
- Combined heat and power systems; world's first fuel cell heating appliance
- Hybrid appliances
- Heat pumps and ice stores
- Wood heating systems (pellets, woodchips, logs)
- Solar thermal systems and photovoltaics, cylinders, system technology and accessories



## Energy-political Framework in Germany



# „Energiewende“ is a big Challenge

CHP is an important part of the Energiewende

Transforming Infrastructure of fossil Power Plants

Electrical Efficiency up to 50%

Compensation of fluctuating renewable Energy locally

Expansion and Integration of fluctuating renewable Energy

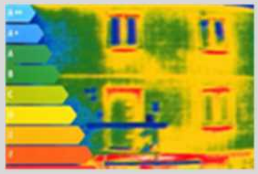
Option to build a Virtual Power-Plant (VPP)

Usage of Biofuels (Biogas or SNG)

Development of Power-Grids

Load-Removing and Stabilizing of Grids through decentralized Production

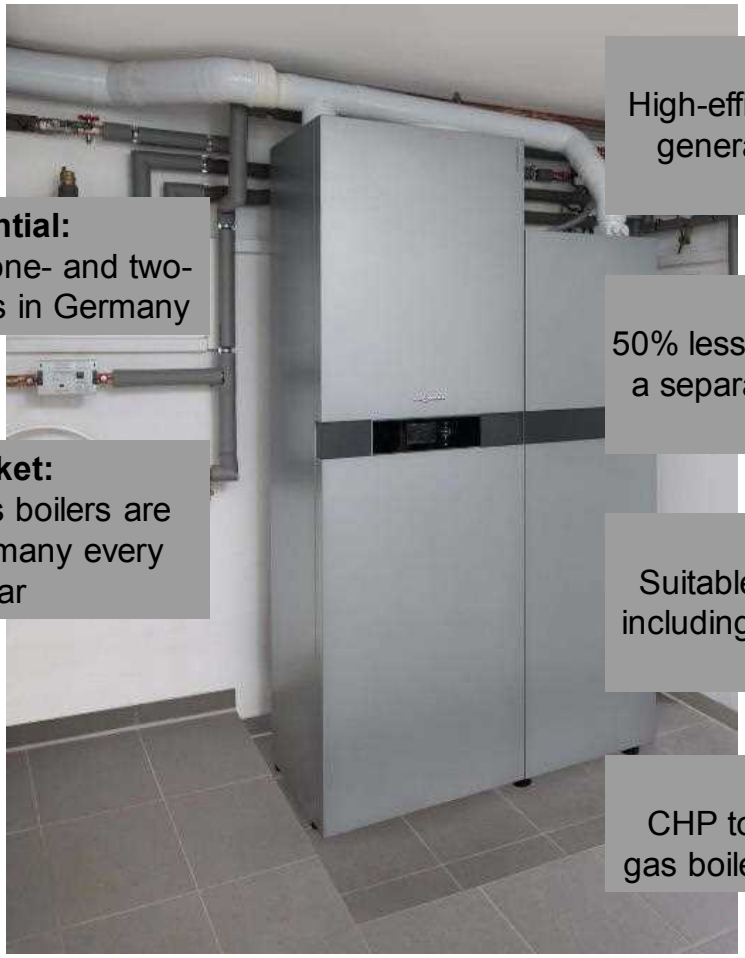
Higher Efficiency with Combined Production of Heat and Power



Increase of Energy-Efficiency



# Why CHP with fuel cells is useful in residential buildings



**Potential:**
14 million in one- and two-family houses in Germany

**Market:**
500.000 gas boilers are sold in Germany every year

**Efficiency:**
High-efficiency, decentralized power generation with almost complete heat utilization

**Climate-friendly:**
50% less $CO_2$ emissions compared to a separated generation of heat and electricity

**Universal:**
Suitable for almost every building - including new buildings with low heat demand

**Simple:**
CHP to install as simple as a new gas boiler which generates electricity

# Micro CHP

CHP-Solutions, specific for any residential home


500 m³ gas / y

4.000 kWh electricity / y


4.000 m³ gas / y

4.000 kWh electricity / y

Heat demand

Power demand

PEM

Fuel cell

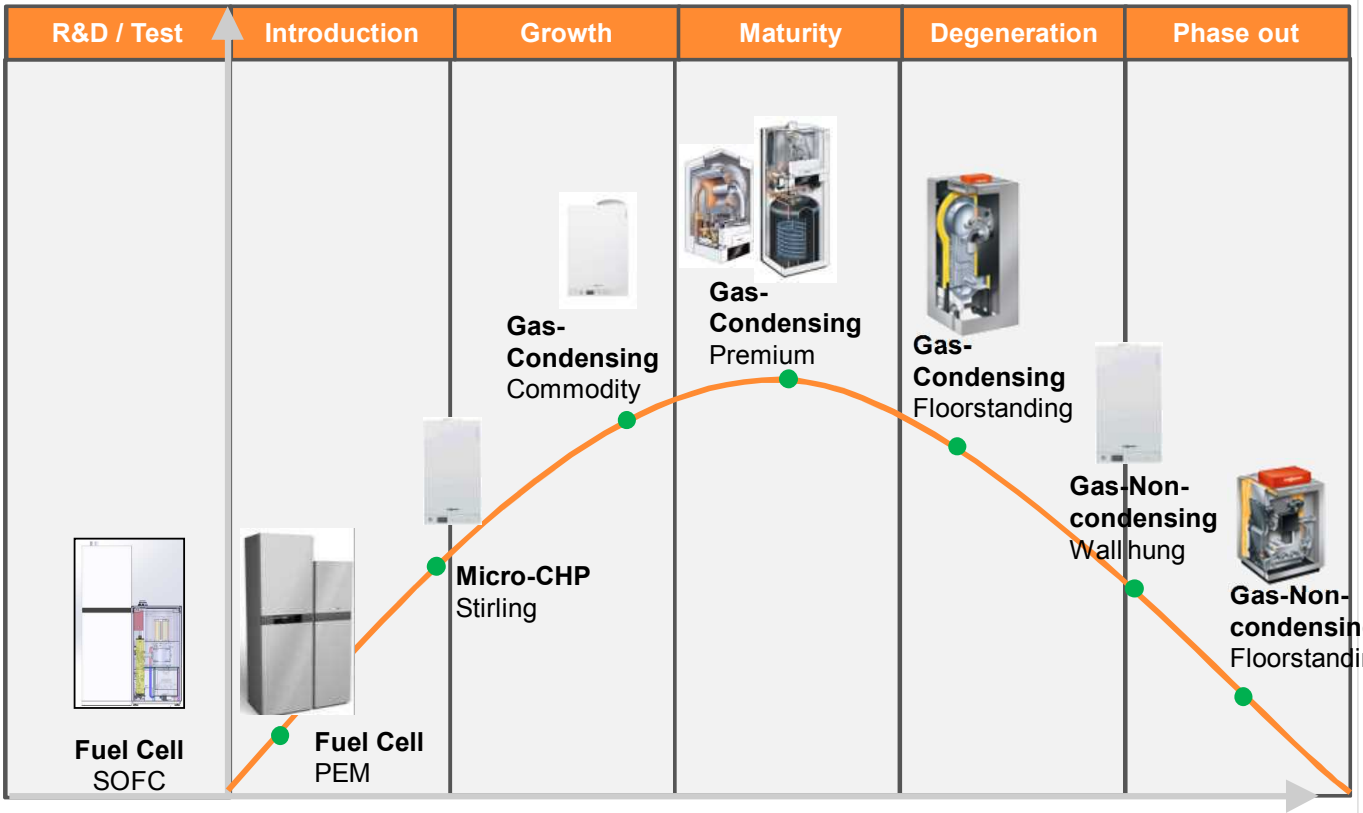
SOFC

Stirling engine



# Gas Technologies

Product lifecycle, R&D and Innovation

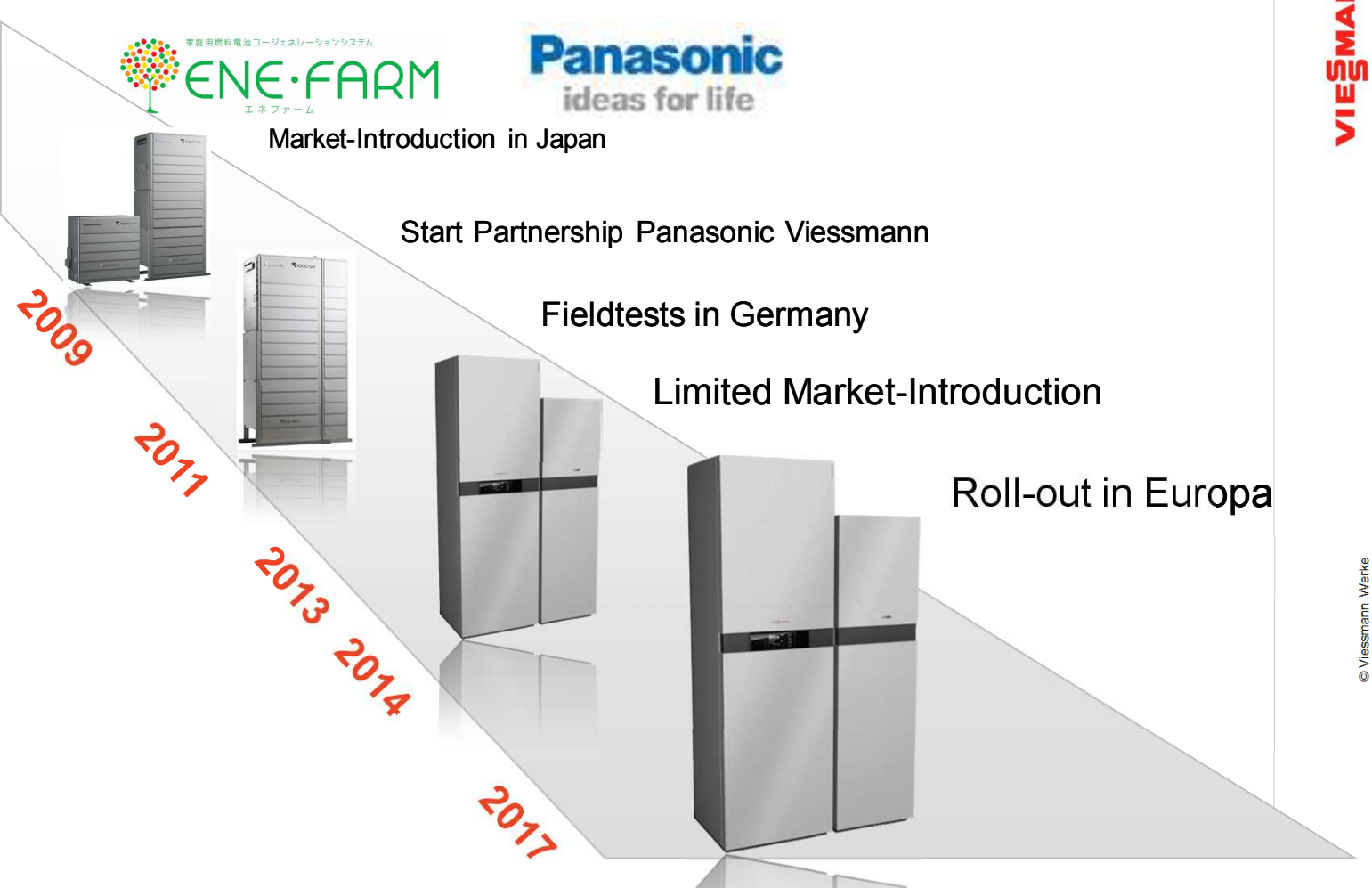


## Partnership between Panasonic and Viessmann since 2011

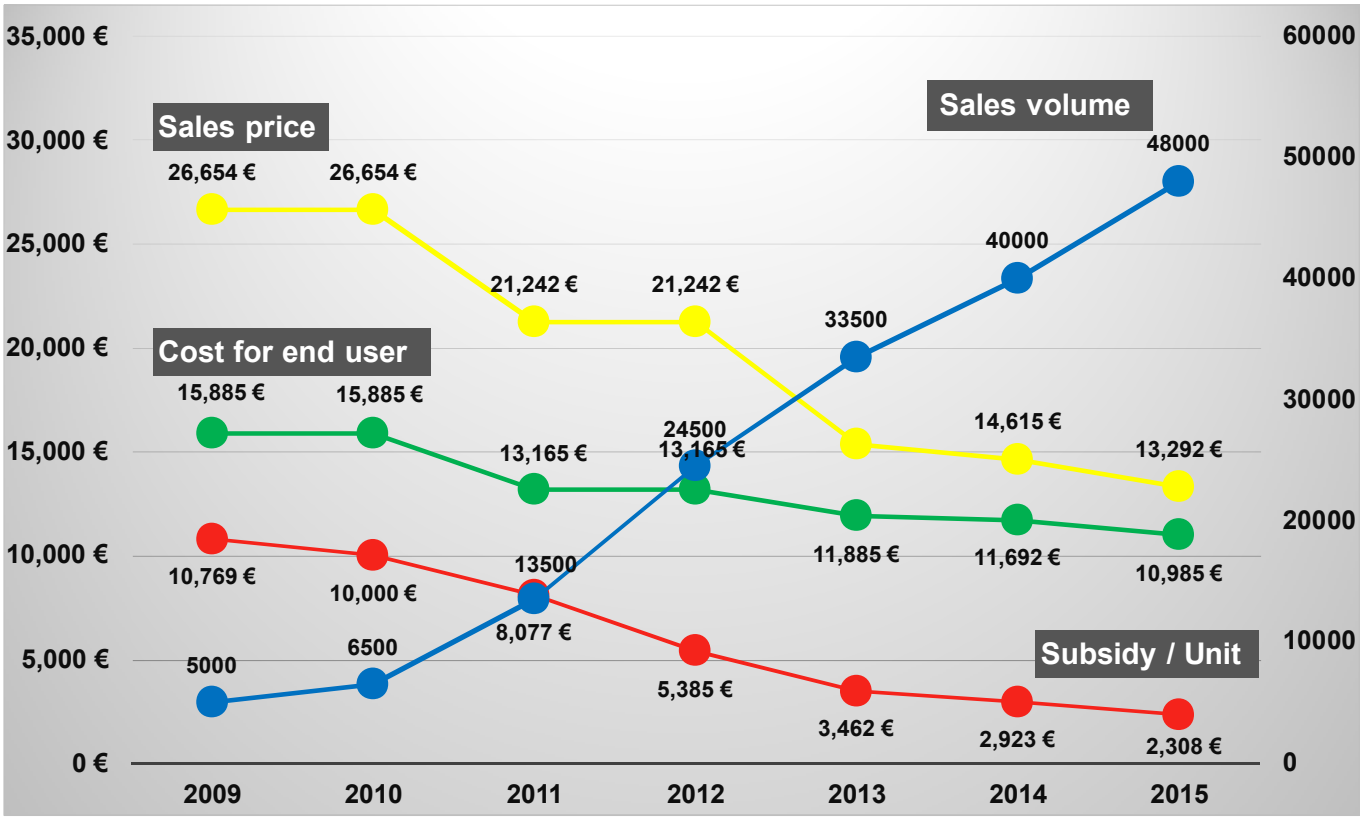
| | Panasonic ideas for life | VIESMANN climate of innovation |
|---|---|---|
| **R & D** | Adaption to European Conditions | System-Integration |
| **Production** | Fuel cell-Module | Electronic, User-Interface, Storage Tank, Peak load-Boiler |
| **Sales** | 3rd Level Support | Marketing, Sales, Training, Service |



## History of the Partnership



# Market introduction in Japan – Success of the “ENE.FARM” program




**Since 2009 approx. 150.000 units have been sold by end of 2015**

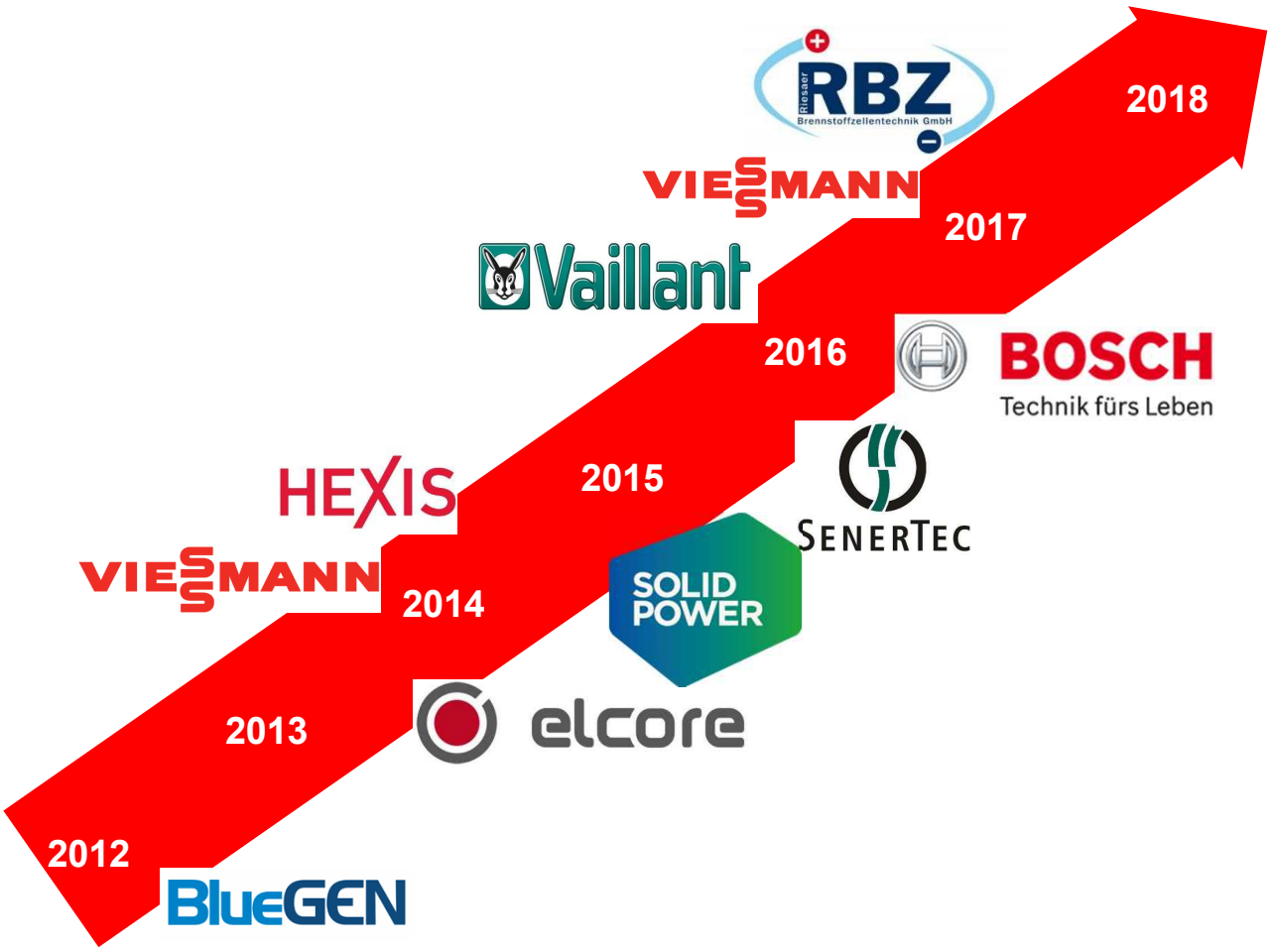


# Subsidies for residential Fuel cells in Germany 2016

Currently no nationwide Program for Market Introduction available

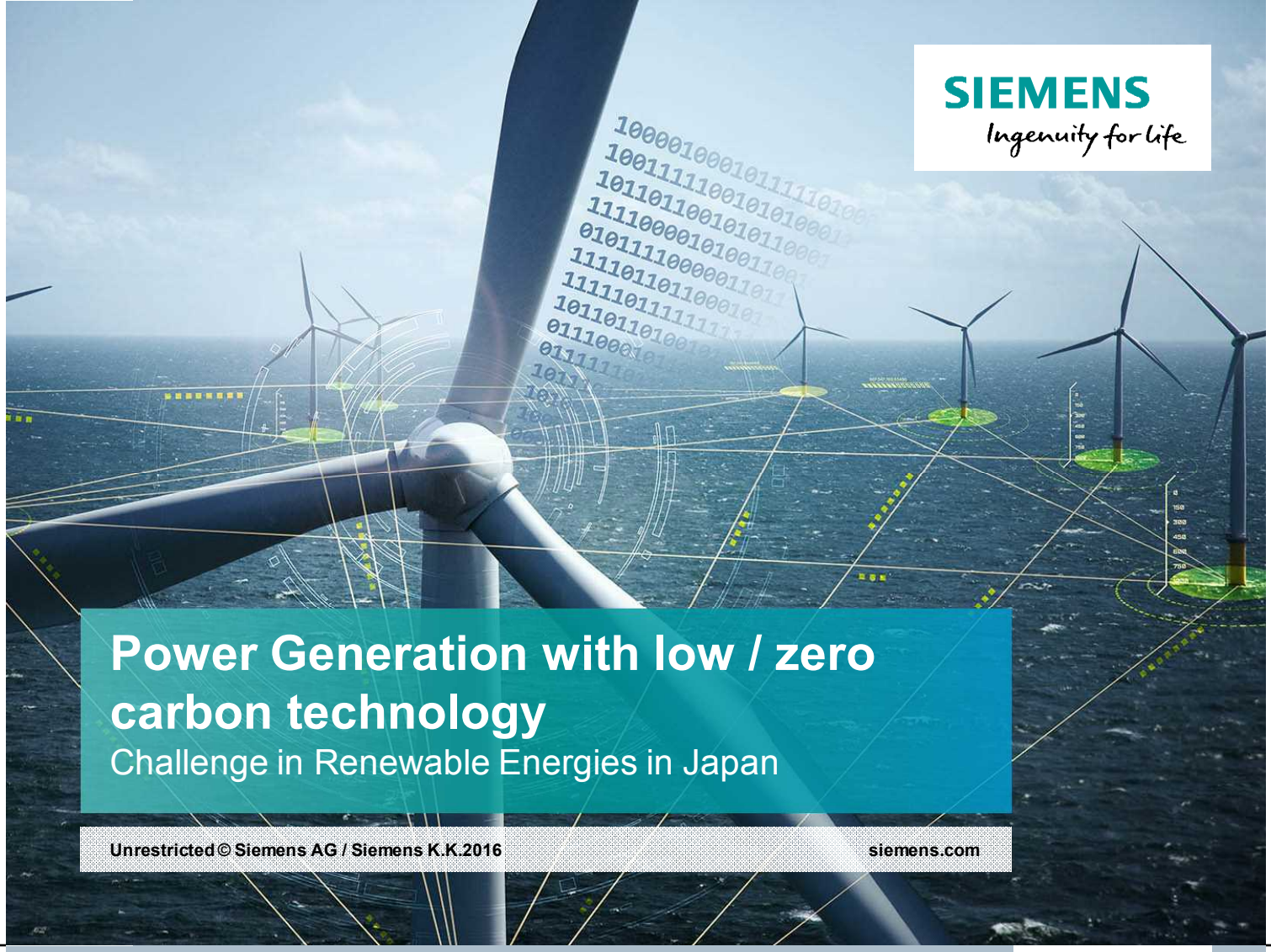
- Nationwide Program “Technology Introduction for Fuel cells” (TEP) envisaged, but not confirmed up to now.
- Micro-CHP-Subsidy (3.515,-€) is not sufficient, to convince enough customers buying a Fuel cell
- Only in North-Rhine-Westfalia a temporary program (7.500 €) is currently available

## European industry is on its way for market introduction






# Thank you for your attention



# Power Generation with low / zero carbon technology

## Challenge in Renewable Energies in Japan



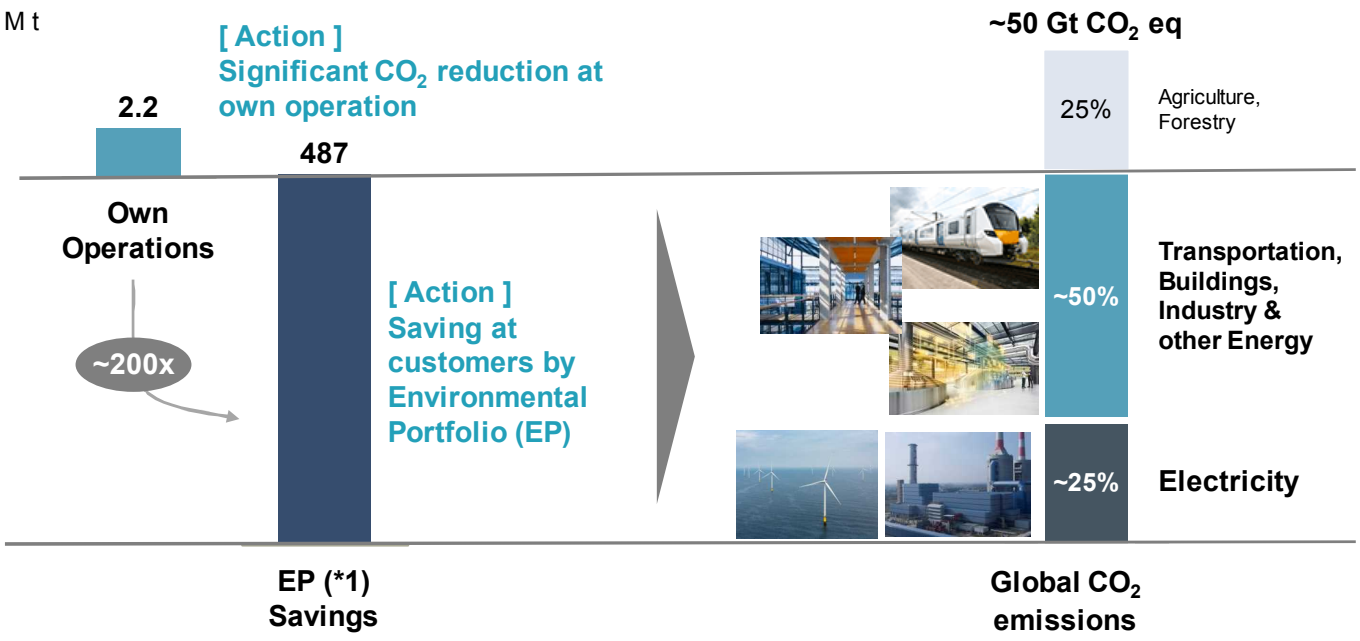
siemens.com

SIEMENS

## Siemens' challenge:
## We realize $CO_2$ reduction by own & customers

### Status of $CO_2$ emission

### Major business domain




**We are influencing in 75% of Global $CO_2$ emissions**

*1: Annual savings at customers with Environmental Portfolio (EP) products sold in FY15 + total annual savings of products installed since 2002 and still in use in FY15
Global CO2 emissions: Based on IPP AR5, rounded based on 2010 data

# Siemens activities in Japan: We support $CO_2$ reduction at Power Generation

SIEMENS

**Now: ～70 units of Turbine & Compressor / ～130 units of Wind Turbine in Japan**

## Highly-efficient Power Generation: World Record Gas Turbine

**Example:**
**H-Class Gas Turbine for Kobelco**
- In past 25 years, H-Class Gas Turbine has reduced $CO_2$ 230kt / y with 13.3% emission improvement. *1
- H-Class is also making world record at Lausward in Germany by >61% net / 85% fuel efficiency

## High-technology Wind Turbine: Direct Drive Wind Turbine


**Example:**
**Eurus Energy**
- Higashi Yurihara Wind Firm under construction
- Clean Energy for ~26k householders *2
- ~ 51kt $CO_2$ reduction / year = Absorption by 3.7 million of cedar trees *3

**EP Products offer environment-friendly power Generation**

*1: Comparison of CCPP by E-class (1990) and H-class (2015) *2: Based on power generation forecast, *3: Based on 14kg of annual absorption / tree

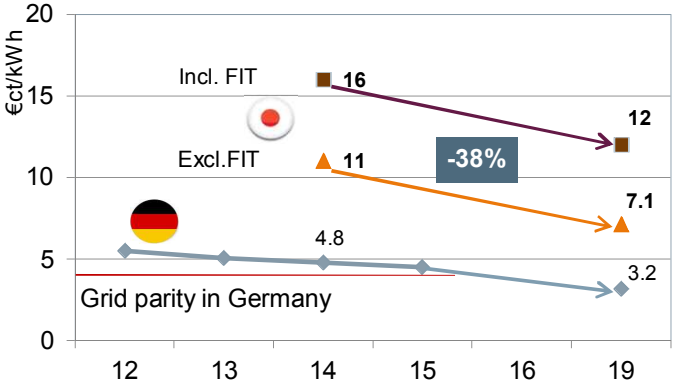



# Japan Wind Power Market: We need to achieve Renewable Energies affordable

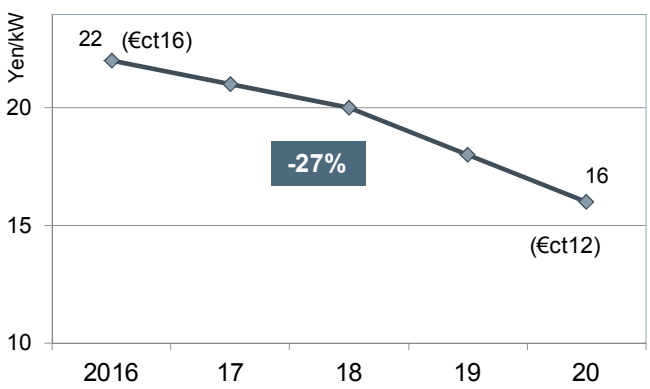
SIEMENS

**Challenges in cost to bring Japanese Wind Firms globally affordable**

**Forecast for LCoE *1 (Wind On shore, LCoE basis) *2**




**Forecast for FIT (Wind On shore) *2**




**Subjects to be managed to realize competitive renewable energies**

### Wind firm owner & Manufacturer

- **Power Efficiency** increase by manufacturers continuously (OPEX)
- Too high **Constriction cost** (60-75% of CAPEX)
- More modernized **Wind firm operation** by remote control / analysis technology (OPEX)

### Government

- Too long & complicated **Environmental Impact Assessment** ( taking 3 – 4 years, too complicated process)
- Too many **Laws** for Environmental protection (～12 related )
- Too many **Laws** for land use (～8) & for maintenance (～8)

*1: Leveraged Cost of Energy *2* Estimation by Siemens KK

# Collaboration:
# Example of challenges in Japan

SIEMENS

| Subject | Experiences in Germany or EU | Recommendation to Japan |
|---|---|---|
| **Subsidy**<br>**Financial incentive** | There were / are too many different, fragmented funding schemes on local, sate, federal & EU level | "**One-stop-shop**" for various funds and subsidies |
| **Law**<br>**Regulation** | There were / are too many laws / regulations conflicting and complicated | **De-regulation** & **Harmonization** of renewable related laws / regulations |
| **CAPEX** | Construction cost is ~ 50% of initial investment (VS 60 – 75% in Japan) | More **Competition and Technology development** in wind firm construction to reduce CAPEX |
| **OPEX** | Reduction of operation and maintenance cost by centralization operation and remote analytics (20-30% less from Japan) | Application of **IoT to Operation & Maintenance** (Remote diagnostics, Preventive maintenance etc..) |





# New technologies will not be the "Show Stopper" of energy transition

SIEMENS

## Electrification

## Automation

## Digitalization








**Siemens will work for it and achieve it !**

**Thank you**

# Auf dem Weg in die 2°-Wirtschaft

The Foundation 2° introduces itself

Stiftung 2°
Deutsche Unternehmer für Klimaschutz

## 2° is an attitude.

An attitude of those taking responsibility now – in order to set the course that limits the dangerous effects of climate change.

The companies organised within the Foundation 2° count themselves among those pioneers in climate protection.

# 2° is an opportunity.

A chance for those who set up their businesses now, to be economically successful in a low-carbon economy of the future.

The companies of the Foundation 2° understand and tackle climate protection as a business opportunity.

# Our Organisation

## We are...

... a platform for active cooperation. Together, we find answers and solutions to issues of entrepreneurial climate protection.

...set up cross-sectorally – spanning various branches of the economy – to represent a diverese spectrum of the economy.

... a non-profit foundation that works towards climate protection.


Meeting with German Chancellor Angela Merkel

Stiftung 2°
Deutsche Unternehmer für Klimaschutz

# Our goals

- Advancement of climate protection and sustainable use of natural resources
- Establishment of a market-based political framework for climate protection
- Strengthening the solution-oriented competence of German companies in the interest of climate protection

Stiftung 2°
Deutsche Unternehmer für Klimaschutz

# Our supporters

- 12 companies
- 200 billion € turnover
- 800.000 employees

AIDA
B/S/H/
DAIKIN
DB Mobility Networks Logistics
FUCHS
Gegenbauer Facility Management
otto group
PUMA
ROCKWOOL
SCHÜCO
Schwäbisch Hall-Stiftung bauen - wohnen - leben
T

Stiftung 2°
Deutsche Unternehmer für Klimaschutz

# Our supporters

## Climate protection is top priority.

We are a **CEO-initiative**.

The CEOs of the companies supporting the Foundation 2° identify themselves with the goal of limiting global warming to well below 2°.

Die CEOs der Stiftung 2°

Stiftung 2°
Deutsche Unternehmer für Klimaschutz

# Climate Change Conference Paris 2015

# Paris means for the economy that...

... the investments in fossil energies will rapidly **decrease**

... projects of a low-carbon economy will be supported by a **better investment environment**

... investments in renewable energies, in measures of climate protection, adaptation and against damages due to climate change will **increase** rapidly

... and politics will further climate protection with **legislative instruments**.


Foundation 2° on board the "Train to Paris“

Stiftung 2°
Deutsche Unternehmer für Klimaschutz

# Declaration on Paris

## 35 companies declare:

- Paris marks the global turning point
- Companies act as pioneers
- Policy has to lay the political and regulatory groundwork


Stiftung 2°
Deutsche Unternehmer für Klimaschutz


# Our activities

# Our activities

- **Dialogue** with leading political representatives
- **Mediation** between economy and science
- **Best-Practice exchange** und platform for dialogue
- Public relations
- Development of climate protection initiatives

Intensive dialogue between CEOs of the Foundation 2°, Minister of the Environment Barbara Hendricks and scientists on board the “Train to Paris“

Stiftung 2°
Deutsche Unternehmer für Klimaschutz

# On the way to a 2°-economy

## The decarbonisation initiative

- Through our business related activities we support the german federal climate goals: **95 percent GHG-Reduction by 2050.**
- We prepare our supporting companies with **climate strategies** for a **2° -economy**.


Stiftung 2°
Deutsche Unternehmer für Klimaschutz

# On the way to a 2°-economy

## The decarbonisation initiative

- Implementation of **interbranch clusters** such as mobility, buildings, industrial production, supply chain, smart cities
- The cluster method enables companies to **develop solutions and activities** with a positive result for the climate
- Self-contained **local projects to put climate protection into action** are the ultimate goal

Stiftung 2°
Deutsche Unternehmer für Klimaschutz

# Decarbonisation initiative

## Mobility Cluster

- What is the **need for action** for a mobility transition that decarbonises the mobility sector by 2050?
- Which **instruments and cooperations** can companies use to set up their mobility in a climate friendly way?
- Which **political groundwork** do they need for this?

Stiftung 2° Deutsche Unternehmer für Klimaschutz

# Decarbonisation initiative

## Building Cluster

- How do we **move forward in a transition in the heat sector** with regard to the goal of a nearly climate-neutral buidling sector until 2050?
- What **instruments and cooperations** can companies use to set up their buildings in a climate friendly way?
- What **political groundwork** is needed for this?


Stiftung 2° Deutsche Unternehmer für Klimaschutz

# Thank you
# for you attention!

**Foundation 2° - German CEOs for climate protection**
**(Stiftung 2° – Deutsche Unternehmer für Klimaschutz)**

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Deutsche Unternehmer für Klimaschutz