

# Application of Renewable Energy for ZEH and Its Contribution to the Grid

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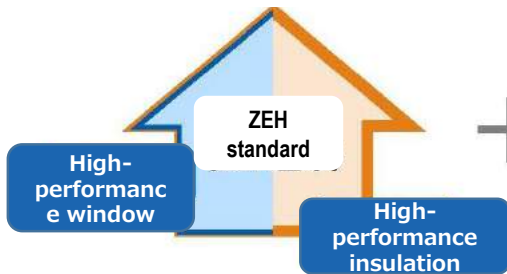
1 ZEH: Definition and Road Map

2 ZEH+: Definition and Expected Contribution to Regulating Capacity of the Grid

# net Zero Energy House (ZEH): Qualitative Definition

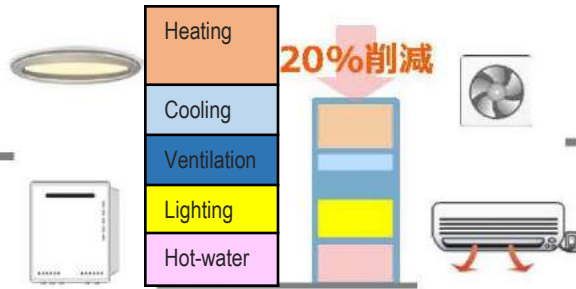
Net annual energy consumption by a household: Near to ZERO or less

Minimum use of Energy  
(Cool in summer,  
warm in winter)



Use Energy Efficiently

Typical residence



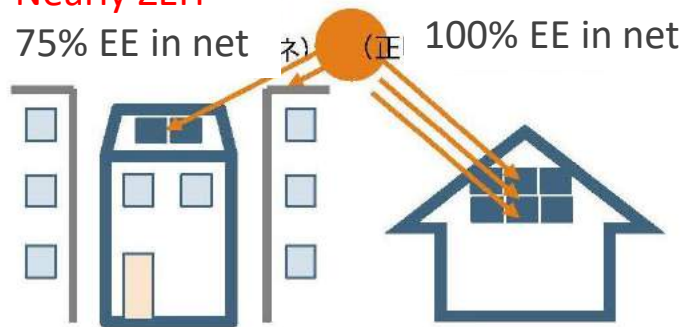
Generate Energy

Nearly ZEH

75% EE in net

ZEH

100% EE in net



Source: Policies for Promotion of ZEH and Related Budget Bills for FY2018,  
Agency for Natural Resources and Energy, METI, March 2018

Highly insulative  
(Energy Efficiency)



Highly Efficient Equipment  
(Energy Efficiency)



Solar PV Generation  
(Energy Creation)

Economic benefit after 11<sup>th</sup> yr.

In case  
**11yen/kWh**  
Post FIT Price



# Economic Benefit from PV Power Generation

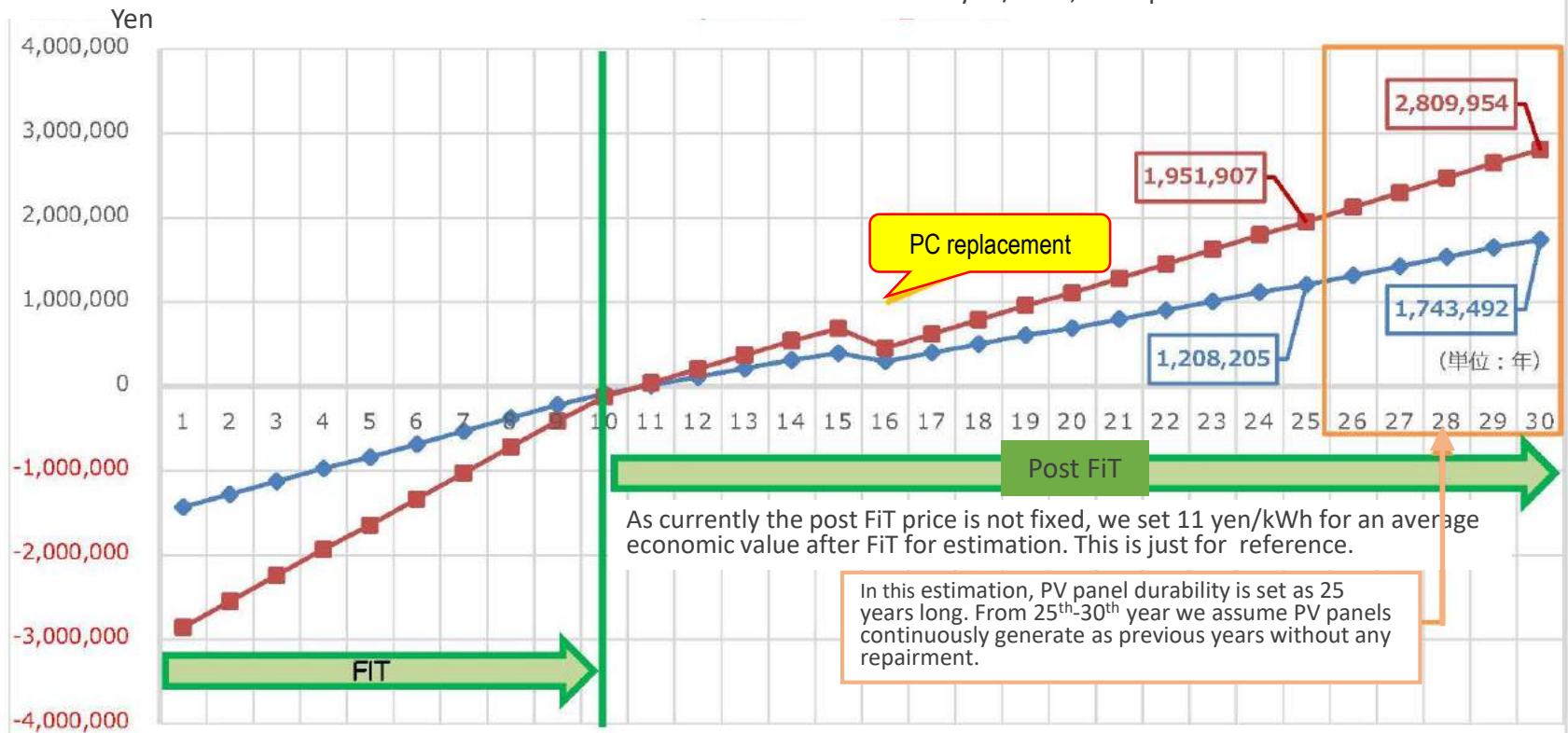
Looking forward to the future!



## Accumulated Profit (Economic return – Domestic expenses)

\* Post FIT Price = 11yen/kWh, Cash purchase

In 2018, Fukuoka For Internal Training Use

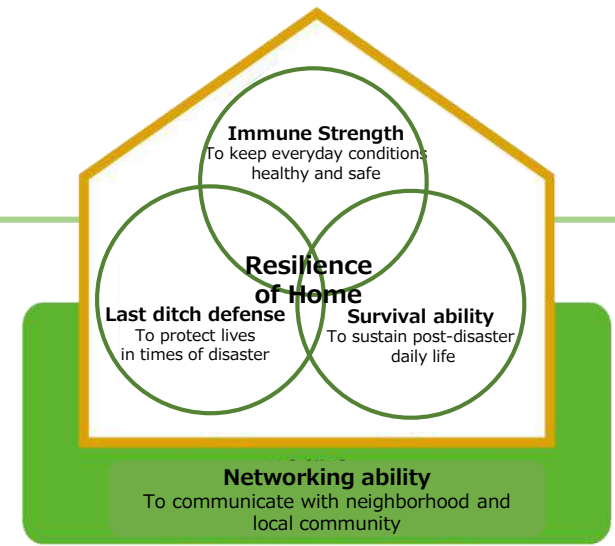


Note: FIT purchasing ends at the 10<sup>th</sup> year.

This estimation is based on several hypothetical conditions, and the calculated results are not guaranteed.

# Co-benefit of ZEH: Resilience

For disaster-prone Japan,  
resilience is critical



## ■ Energy Creation

### Q29

Have any power source available in a blackout?

Yes

No

Solar PV, fuel cell, gas engine co-generation, batteries, and PHV & EV equipment can power communications, lighting and other appliances you cannot live without even in a blackout.

## ■ Enhanced Insulation

### Q30

Prepared for a few days you must keep off the cold without heating?

Yes

No

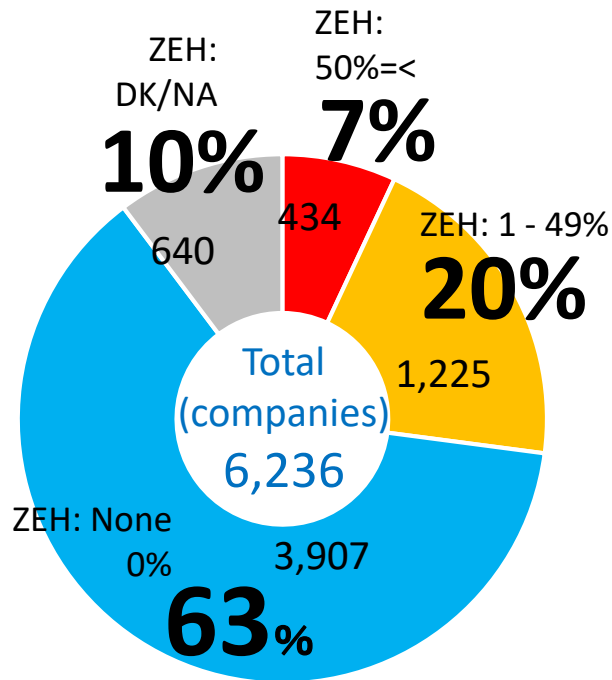
A highly insulative house keeps out the cold with no heating when lifelines fail after a natural disaster. Alternative heaters and cold weather protection gear also help.

健康を支え災害に備える住まいと暮らし

Source: CASBEE® Resilient House Checklist (FY2016)

Japan Sustainable Building Consortium

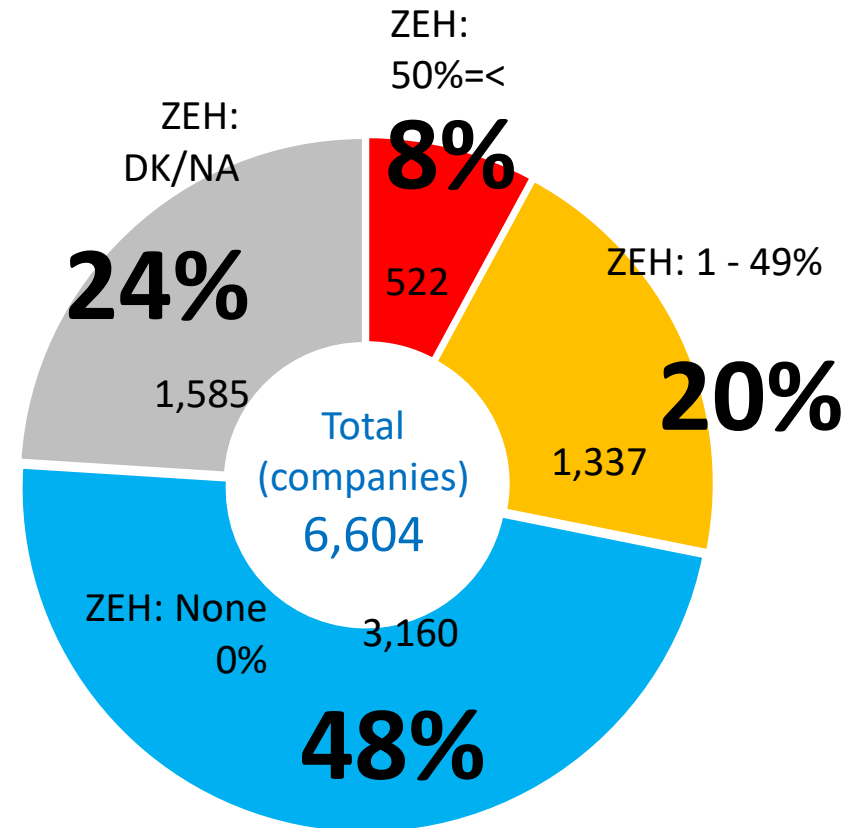
FY2016



11%

Approx. 34,000 /300,000 Houses  
(Custom-built single-family house)

FY2017



14%

Approx. 42,000 /300,000 Houses  
(Custom-built single-family house)

# ZEH (Zero Energy Houses) Promotion Programs (2018 Budget)

Three ministries (METI, MLTI, MoE) collaborate to promote energy efficiency and CO2 reduction in houses. Aiming that more than 1/2 new custom houses built by housing manufacturers to be ZEH by 2020 and an average of all new houses including ready-built houses and multi-family residential buildings to be ZEH by 2030

**Advanced low carbon houses highly reduced CO2 emissions** (Life-cycle carbon minus houses (LCCM house))

FY2018 Max. 10,221 million yen (MLIT)

## Support to ZEH

**ZEH to be promoted to scale up the supply**

\* Higher performance ZEH, ready-built house, multi-family residential building (medium to high rise)

FY2018 Max. 60,040 million yen (METI)

**ZEH to be continuously promoted**

\* Custom house, multifamily residential building (low rise)

FY2018 Max. 8,000 million yen (MoE)

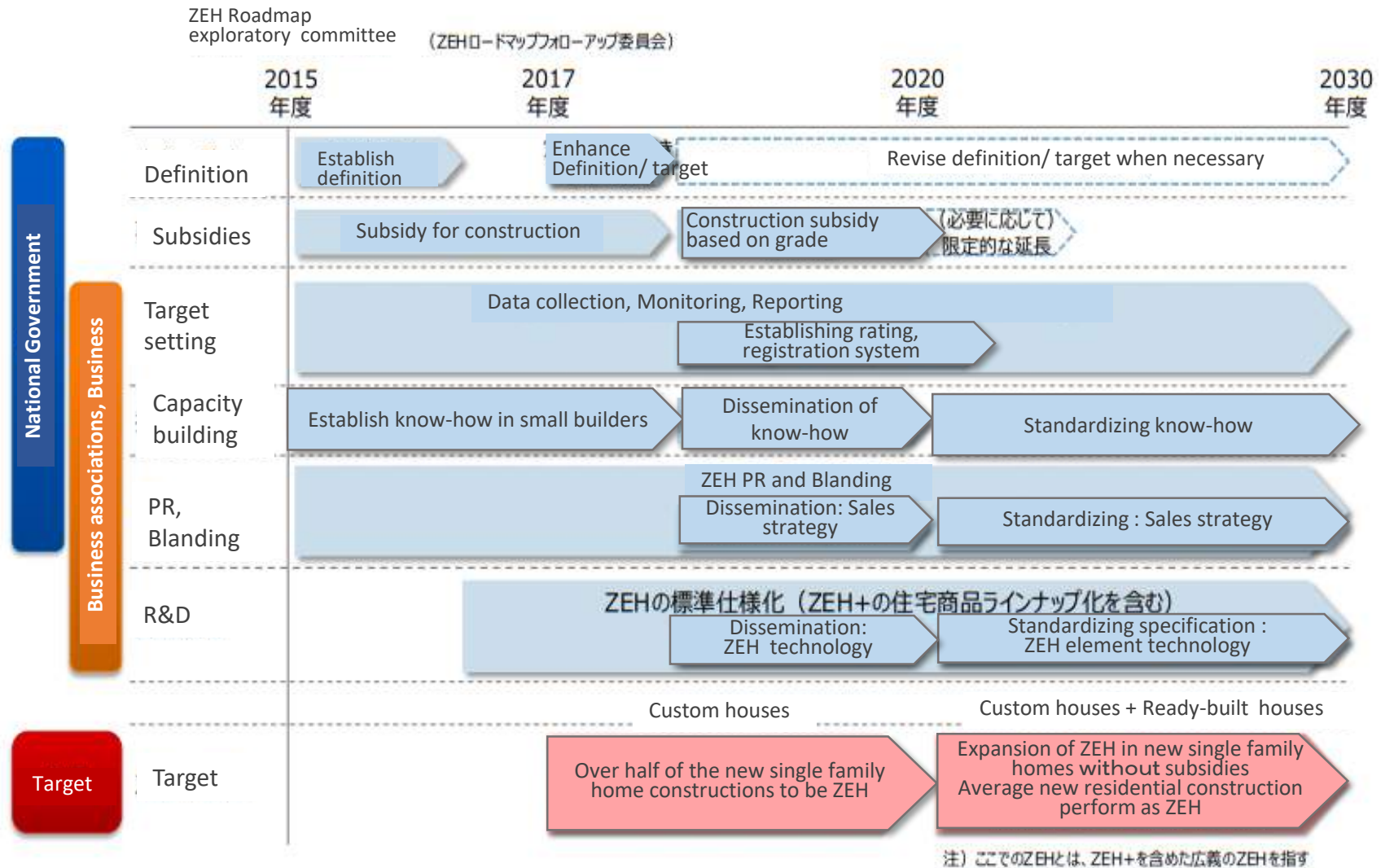
**ZEH to be built by collaboration among small and medium builders** \* Incentive for builders with little experience

FY2018 Max. 11,500 million yen (MLIT)

Standardizing the applications using Building-housing Energy-efficiency Labeling System (BELS)

One-window information provision

# Road Map for Promotion of ZEH



Source: ZEH Road Map Follow-up Committee Report, May 2018



May 2018

# "ZEH Road Map Follow-up Committee Report"

ZEH ロードマップフォローアップ委員会

とりまとめ

平成30年5月

## Key points

### 1. ZEH+, a new concept ← [See next page for details.](#)

- (1) In-depth energy saving solutions
- (2) Enhanced insulation
- (3) Advanced energy management (ECHONET Lite)
- (4) Application of EV

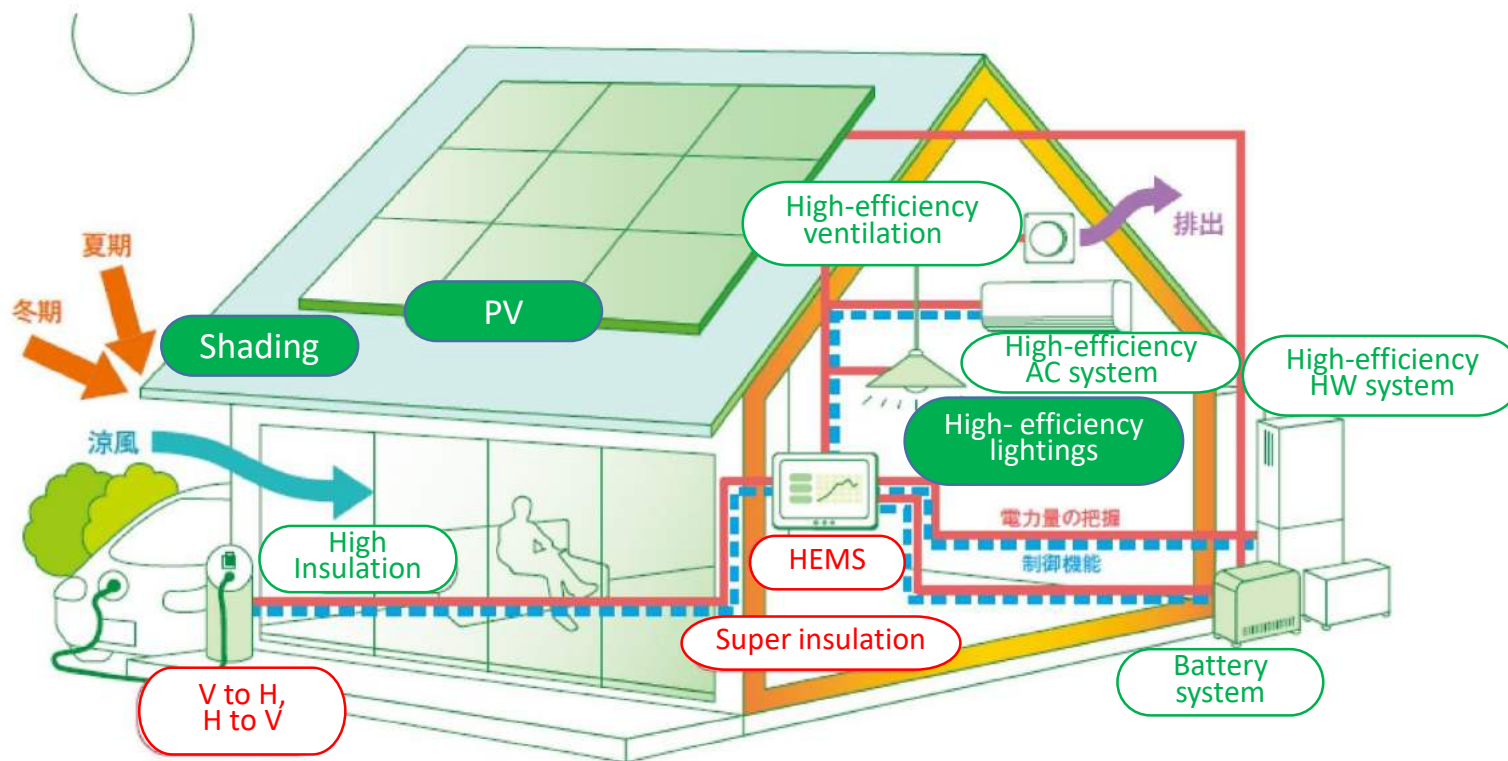
### 2. Clear target set for 2030

"ZEH" should be achieved as a total among all the newly-built single-family houses, ready or custom-built.

### 3. Closer coordination among policy programs and modification of upper targets.

- (1) Renewable energy policy
- (2) Policies for coordination and upgrade of the grid, incl. DR and VPP
- (3) Policies for controlling global warming
- (4) Houses with other solutions than energy saving (insulation) (IoT, LCCM, etc.)

# ZEN+: Definition



Subsidy target technology



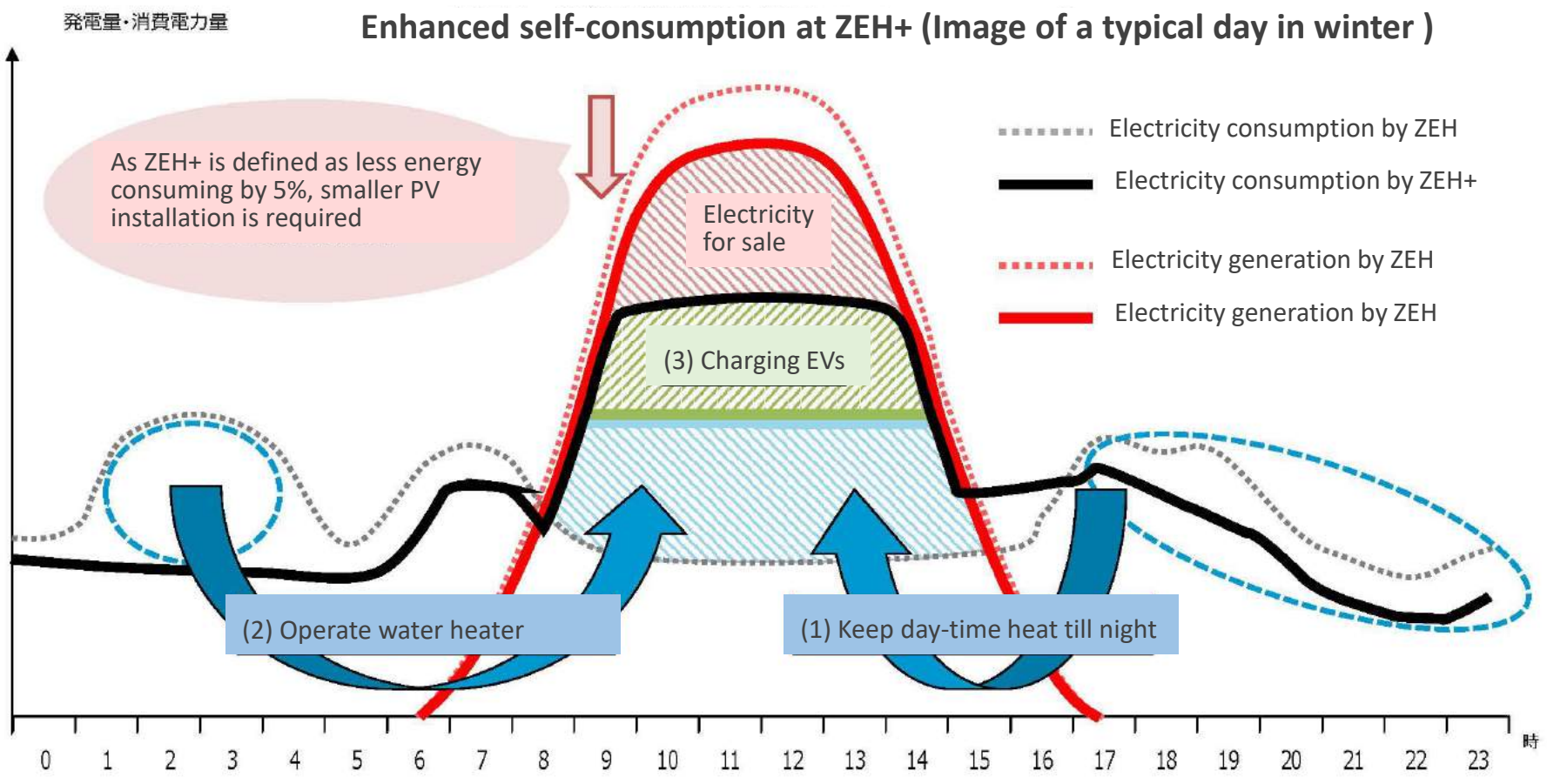
Adopt at least 2 out of 3 elements

	Insulation	EE	IEE+RE	Promote self-consumption	Subsidy FY2018
<b>ZEH+</b>	Standard for insulation for ZEH	<b>25%</b>	100%	2 options out of 3 above	<b>115万円/戸</b>
<b>ZEH</b>		20%		—	70万円/戸

Source: Extracts from materials released by METI

# For Constant Growth of ZEH with Falling FIT Rates

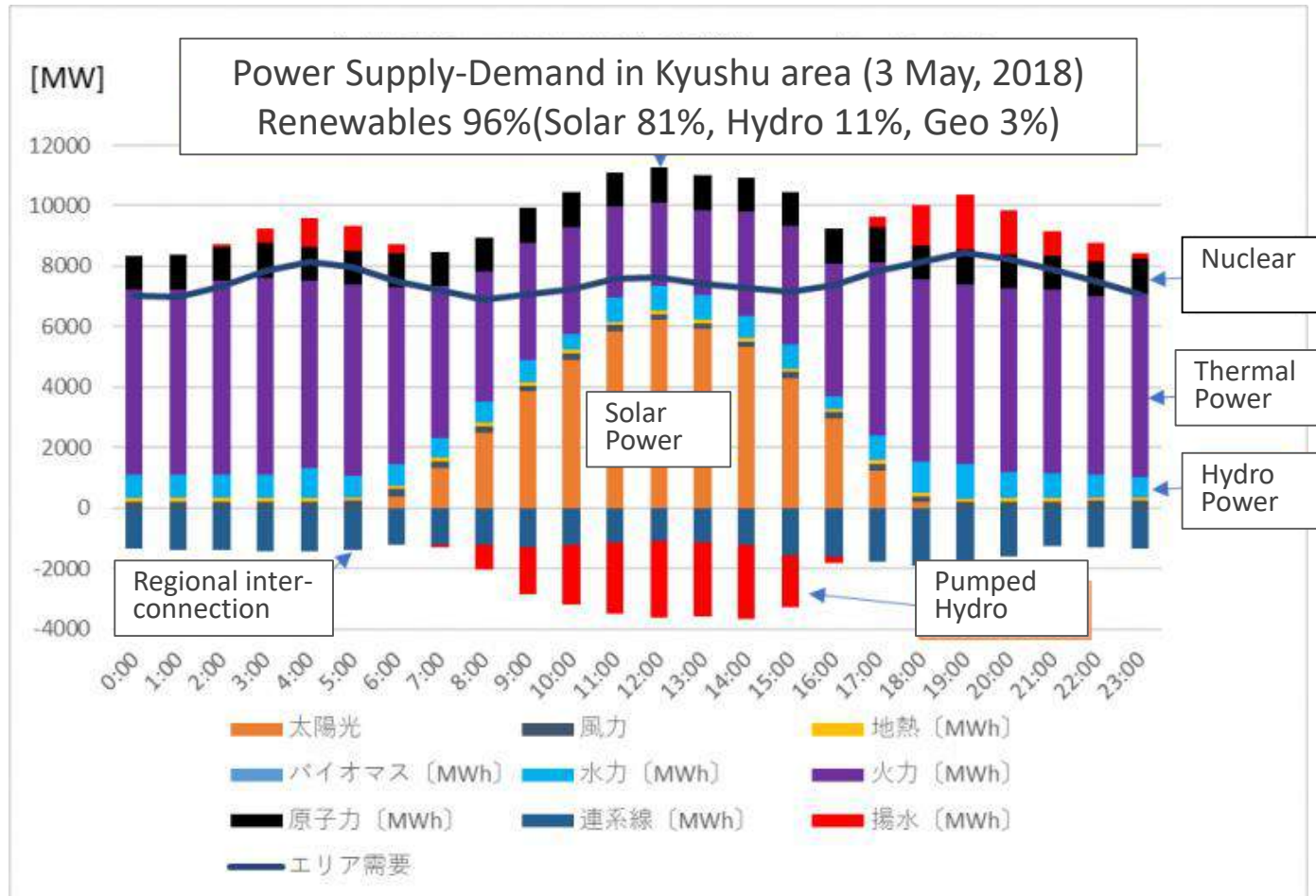
- Provide support for demonstration of **ZEH+, an initiative for increasing self-consumption of power.**
- Besides a 25% energy saving (20% for ZEH), at least two of the three actions should be implemented to demonstrate effectiveness for more self-consumption of renewable energy: (1) Further enhancement of envelope thermal performance; (2) Application of advanced energy management for controlling water heaters and other appliances; and (3) Charging of EVs.



Source: Extracts from materials released by METI

# Why Need to Promote ZEH+? - Another Reason

## Curtailment seems imminent by Kyushu Electric Power: Electricity Generation in Kyushu (May 3, 2018)

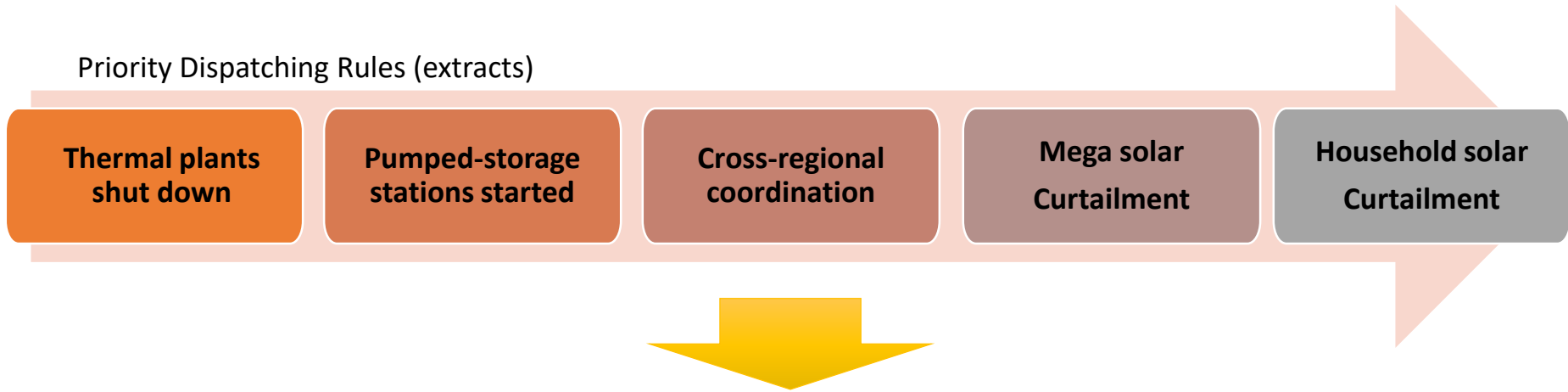


# Why Need to Promote ZEH+? - Another Reason

Soon, at peak hours for solar PV output:

**Demand < Supply** and **Balancing mechanism** required.

Priority Dispatching Rules (extracts)



**Instead of Curtailment**

**ZEH+for Self-Consumption!**



# Public Relations for Output Suppression of Renewable Energy (Kyushu Electric Power, September 8, 2018)

## 九州電力は、再生可能エネルギーの受け入れ拡大に努めています

九州グループ  
ずっと先まで、明るくしたい。

**Q1 再生可能エネルギーをたくさん受け入れるために、どんなことに取り組んでいるの？**

【九州における太陽光発電の設備量】[単位:万kW] ※離島を除く

2013年3月末: 111  
2017年3月末: 697  
2018年7月末: 803 (約7倍)

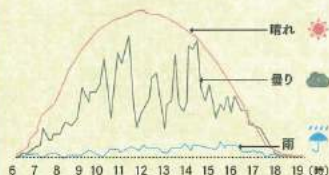
九州では特に太陽光発電が普及していますが、より多く受け入れるために、火力発電の出力を下げるなど、さまざまな対策に取り組んでいます。

### 再生可能エネルギーの受け入れ拡大に向けた取り組み

#### 1 火力発電の調整

晴れの日は火力発電の出力を下げるなど、太陽光発電を最大限活用するための調整を行っています。

太陽光発電の出力変動(イメージ)



晴れ 火力発電の出力を下げる  
曇り雨 火力発電の出力を上げる

#### 2 揚水発電所の活用

太陽光が多く発電する昼間の電気を使って揚水発電用の水をくみ上げ、電気が足りない時に水を流して発電しています。

揚水発電とは？



#### 3 大容量蓄電池の活用

世界最大級<sup>※</sup>の蓄電池を設置し、太陽光の出力に応じた充放電を行っています。

※2018年9月1日現在 九州電力調べ



豊前蓄電池実電所(出力5万kW、容量30万kWh)

#### 4 九州外への電力送電

太陽光で発電した九州で消費しきれない電気を、本州へ送り出しています。

**Q2 どうして、こんな取り組みが必要なの？**

電気は発電量と使用量のバランスを常に一致(同時同量)させ、周波数を60ヘルツに保つ必要があります。このバランスが崩れると最悪の場合、大規模停電になる可能性があります。

同時同量  
発電量 = 使用量  
これがくずれると  
周波数が変動  
発電機が破損防止のため自動停止  
複数の発電所の自動停止による大規模停電の恐れ

2003年8月の北米停電では発電まで数日間

### 安定した電気をお届けするために、出力制御をお願いすることもあります。

電気の使用量が少ない春・秋などには、太陽光の出力が大きい昼間に、発電量が使用量を上回る状況が発生することも考えられます。

そのため今年の秋には、やむを得ず一部の太陽光や風力発電の出力制御をお願いする可能性があります。  
(住宅用など10kW未満の設備については、今年の秋は行いません。)

このことによって、年間を通じて見れば、より多くの再生可能エネルギーを受け入れることにもつながります。

みなさまのご理解とご協力をお願いいたします。

[http://www.kyuden.co.jp/enenavi\\_index.html](http://www.kyuden.co.jp/enenavi_index.html)

詳しくはホームページでご紹介しています。

Q エネナビ 検索

九州電力

Source: Nishinippon Shimbun Newspaper, September 8, 2018

# ZEH+ Contributes Flexibility of the Grid System

ZEH+ is expected to provide the grid with regulating capacity. Participation in DR and VPP will deliver economic benefits.

## DR: Demand Response VPP: Virtual Power Plant



Source: Agency for Natural Resources and Energy (METI) website

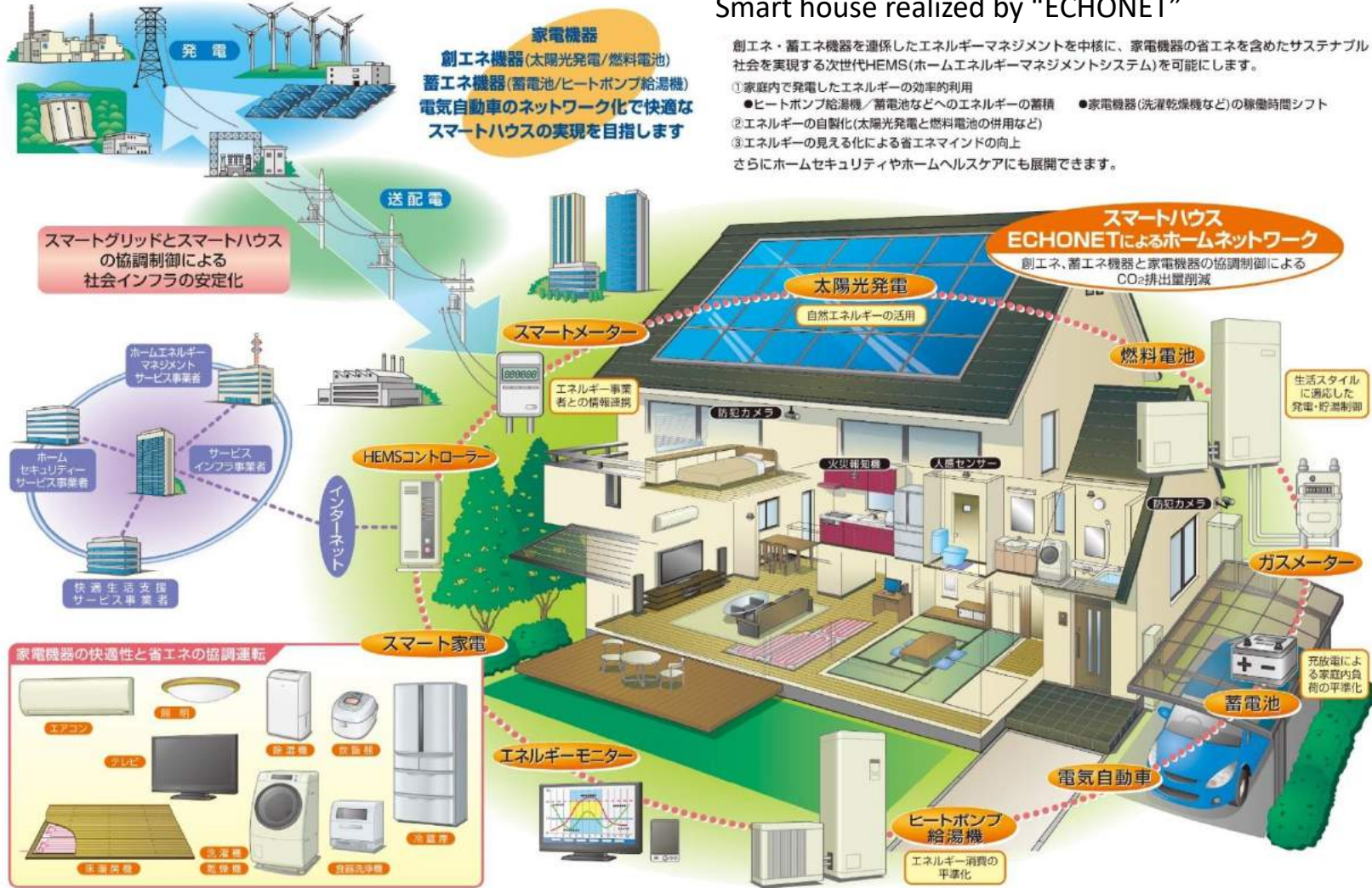


# RZEH+ Contributes Regulating Capacity to the Grid.

## Smart house realized by "ECHONET"

創エネ・蓄エネ機器を連携したエネルギーマネジメントを中核に、家電機器の省エネを含めたサステナブル社会を実現する次世代HEMS(ホームエネルギーマネジメントシステム)を可能にします。

- ① 家庭内で発電したエネルギーの効率的利用
    - ヒートポンプ給湯機/蓄電池などへのエネルギーの蓄積
    - 家電機器(洗濯乾燥機などの稼働時間シフト)
  - ② エネルギーの自製化(太陽光発電と燃料電池の併用など)
  - ③ エネルギーの見える化による省エネマインドの向上
- さらにホームセキュリティやホームヘルスケアにも展開できます。



2010.10.25

Source: ECHONET Consortium (Reprint Permission: # 0174)



# Thank You.

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Minato-ku, Tokyo

The Association for Promotion of ZEH

<http://zeh.or.jp>