自然エネルギー財団
国際シンポジウム「リビジョン2012」

脱炭素社会に向けたエネルギーシナリオ提案

WWFジャパン
気候変動・エネルギーグループ　リーダー
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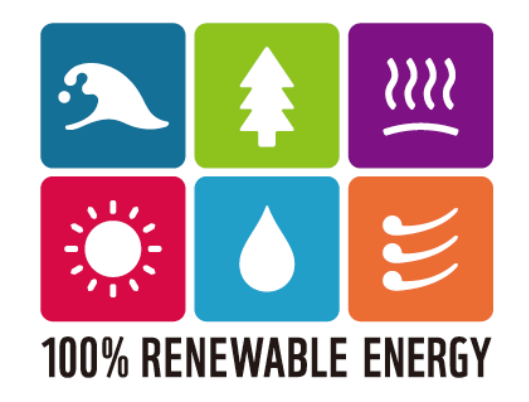
東京国際交流会館

Outline

1. Background
2. Energy Conservation Scenario (Demand Side)
3. 100% Renewable Energy Scenario (Supply Side)
4. Way Forward

Energy Scenario for Japan



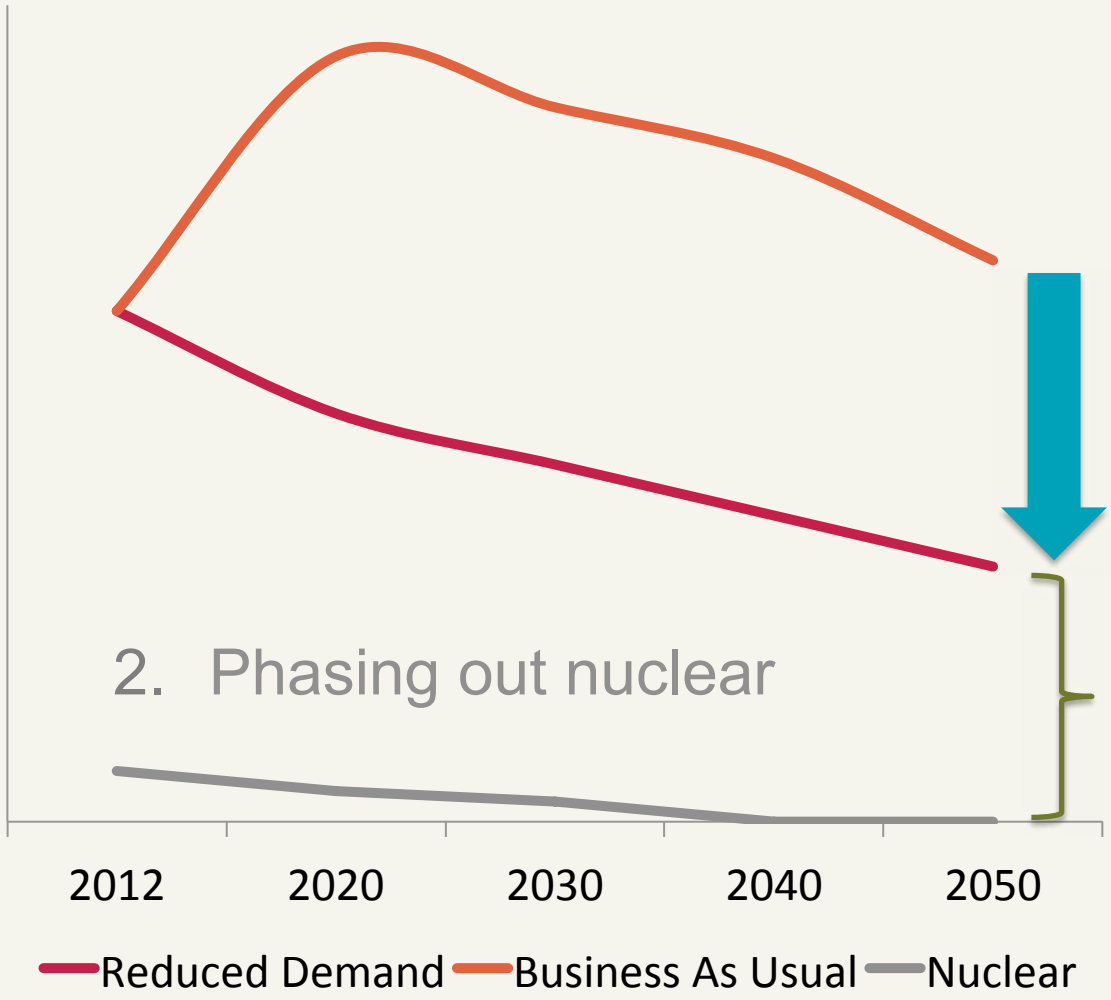
- Commissioned to Dr. Haruki Tsuchiya (Research Institute for Systems Technology)
- Launched in Two parts

  1st part in July on Energy Conservation (Demand side)

  2nd part in November on 100% Renewables (Supply side)

- Part of 100% renewable campaign in WWF Japan

A Simple Vision



1. Cutting energy demand through massive energy savings

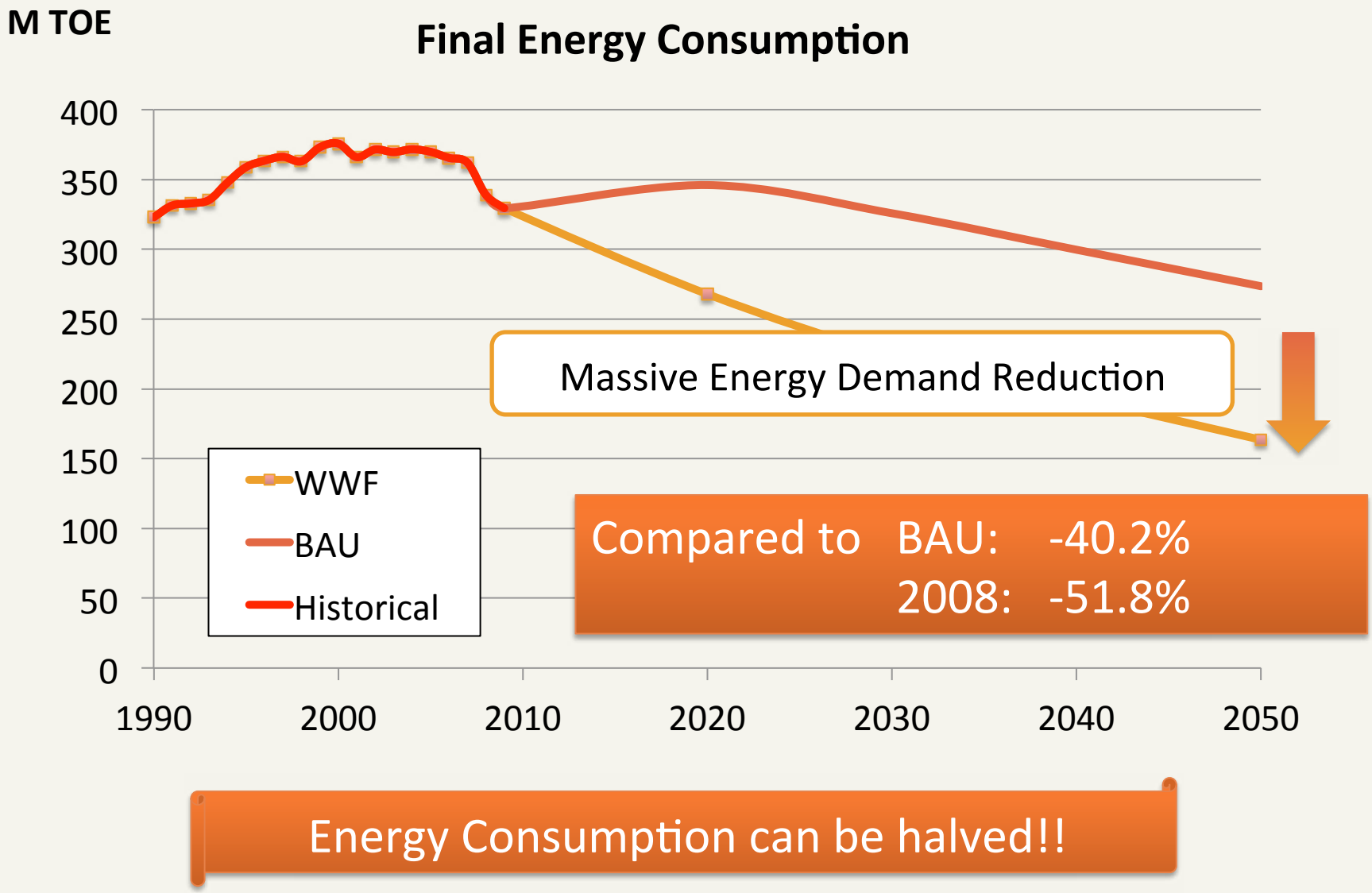
3. Increase the supply of RES

Basic Process of Scenario Creation

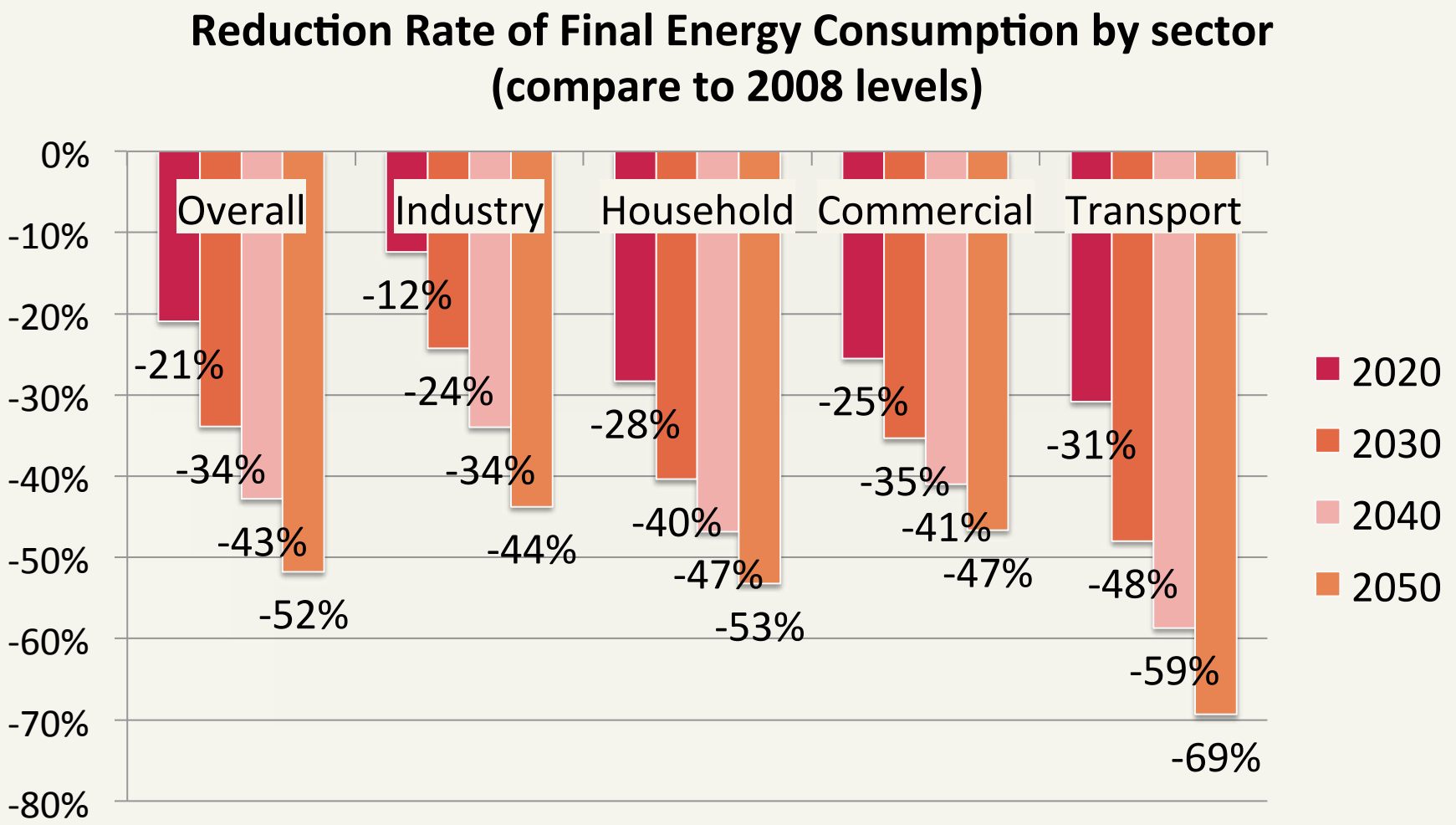
- Followed the basic process of WWF Intenational's *Energy Report* (published in February 2011).

1. Examined Energy conservation potentials
2. Made nuclear phase-out assumption
3. Divided the remaining demand into power and fuels/heat
4. Examined renewable potentials and match the demand
5. Checked the validity of electricity supply and demand throughout a year of 2050

Energy Demand Reduction



Energy Demand Reduction by Sector



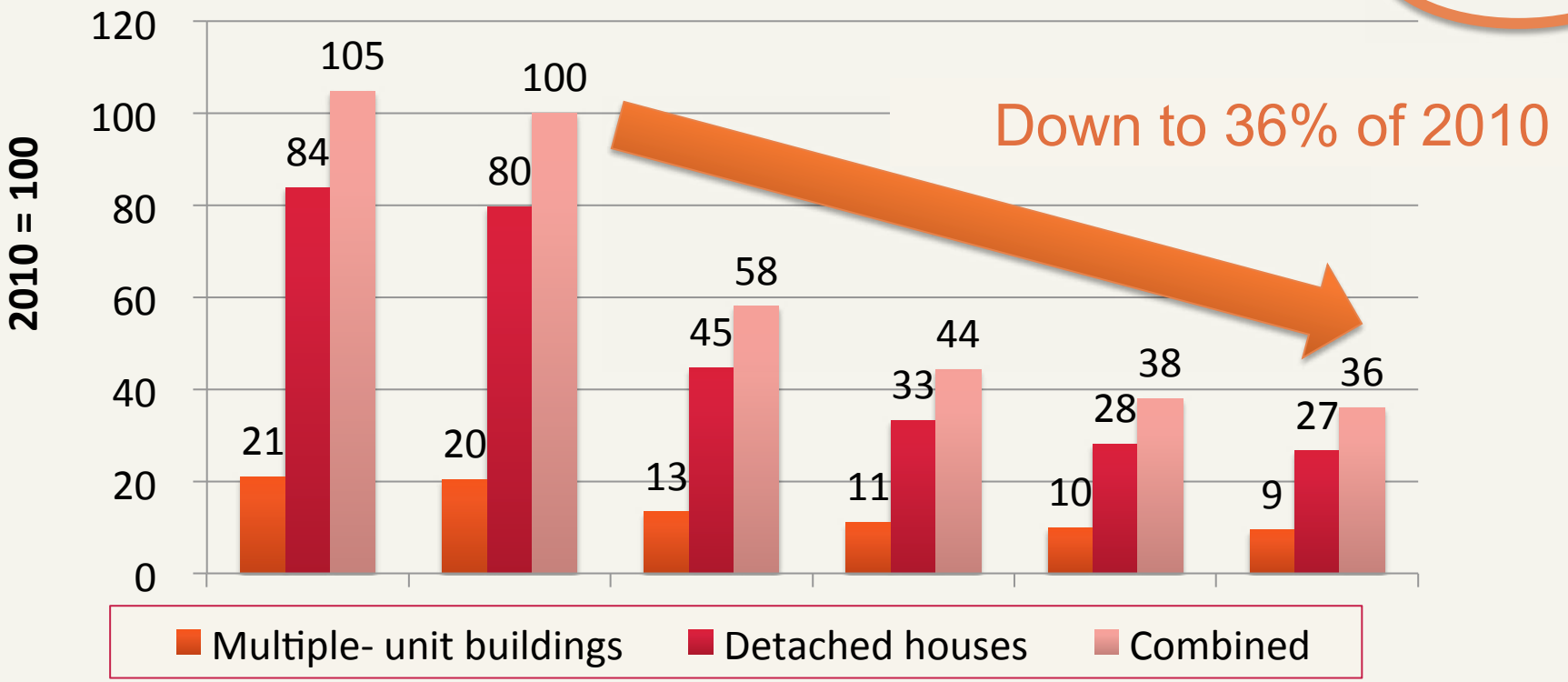
Technologies and Measures

Sector	Technologies and measures
Household	More improved LED replacing conventional lighting / the current “next generation” insulation standard becoming the average / More heat pumps and the average efficiency getting doubled / More highly efficient heat water supply systems (efficiency doubled) / Improved efficiency of home appliances but it gets offset by wider use of them / Home Energy Management Systems and Smart Meter / Share of stand-by electricity consumption 1% in household
Commercial (Building)	The current “next generation” insulation standard becoming the average / More heat pumps and the average efficiency getting doubled / Air-conditioning systems’ efficiency doubled / Greening of the cities / Cool Biz and Warm Biz / More LED, task-lighting, use of natural lighting, etc / Building Energy Management Systems / Improved efficiency of electronic appliances
Industry	Wider use of inverters to achieve efficient motors / Recycling rate in steel production becoming 70% / 30% improvements in other major manufacturing industries
Transport	20% improvement of fuel economy -> all vehicles become EV or FCV eventually / 15% modal shift from truck freight transport to train or marine transport / car sharing / “eco-ship” / efficiency improvement and lighter aircrafts, etc.

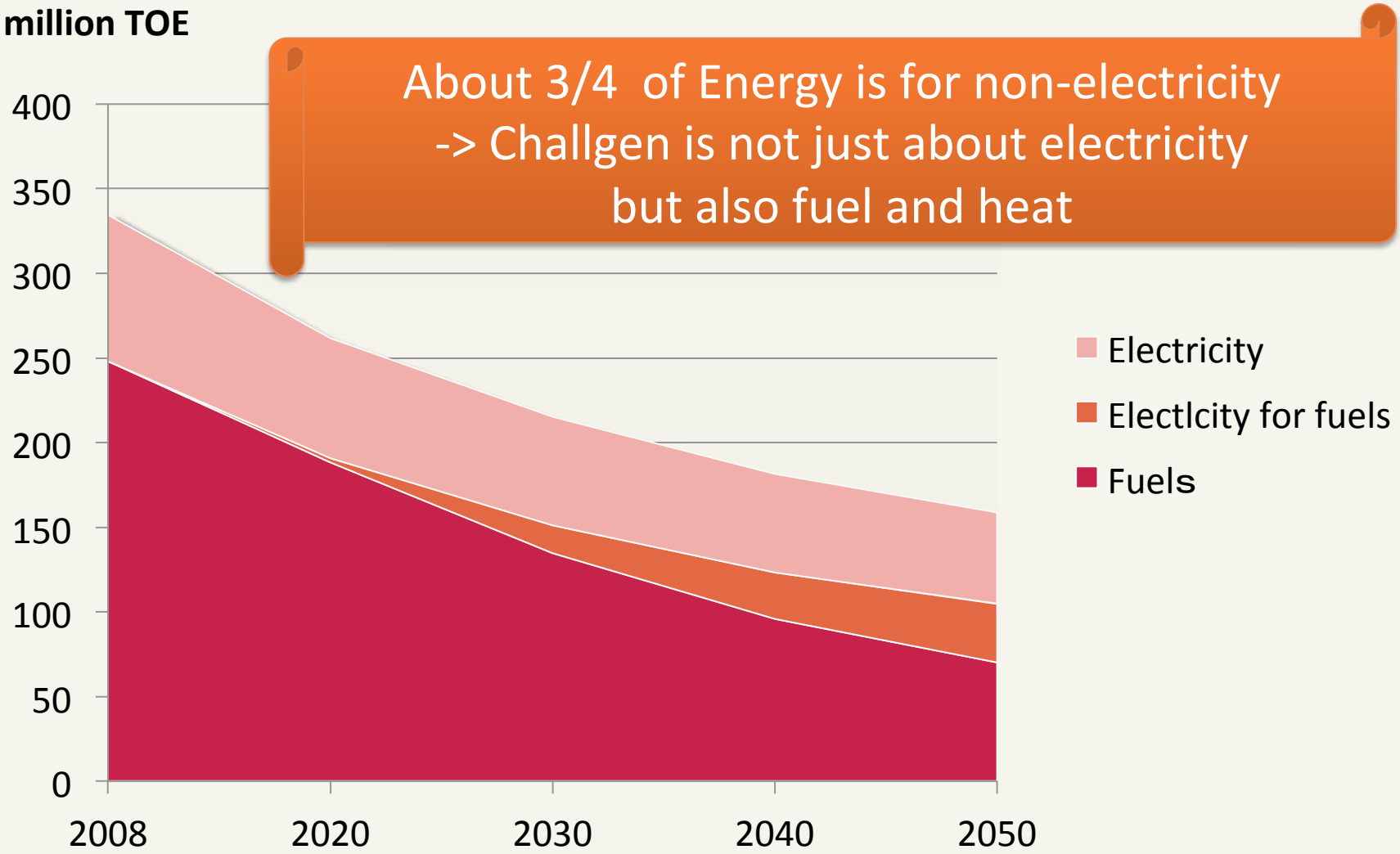
One example: Energy Savings in Household Heating

Compariosn of Efficiency Standards for Households

	Before 1980	Year 1980 Standard	Year 1992 Standard	Year 1999 Standard
Heating and Cooling Efficiency	1	0.925	0.85	0.75



Electricity and Fuel (Heat)



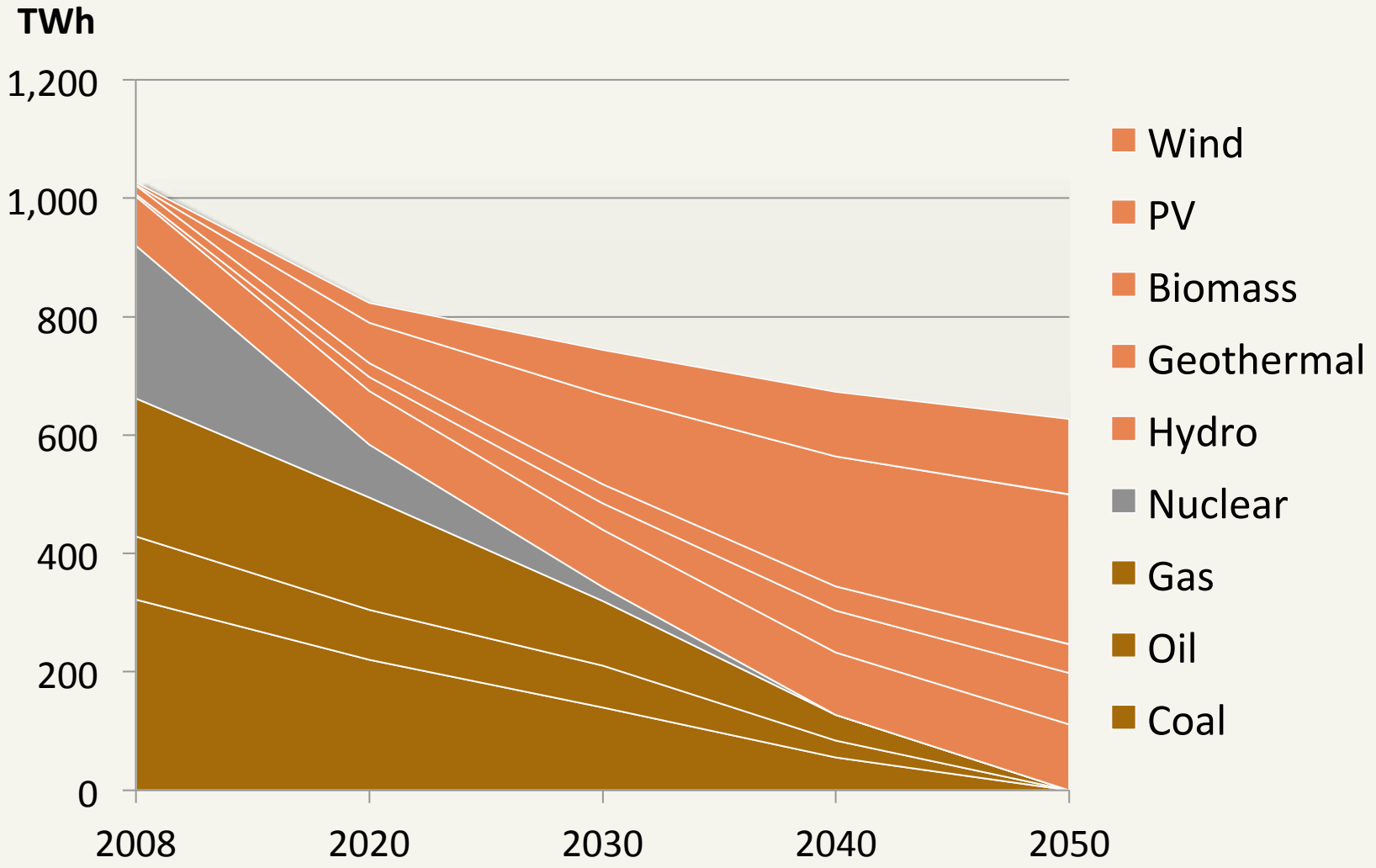
Assessed Potentials of RES Electricity

Source	Capacity (GW)	Load Factor	Generation（TWh）	Actual Use in the Scenario (TWh)
PV	700	12%	736	524
Wind	480	25%	1,051	262
Hydro	27.6	46%	111	111
Geothermal	14.19	70%	87	87
Biomass	8	70%	49	49

For wind and geothermal, some constrains are given for environmental protection.

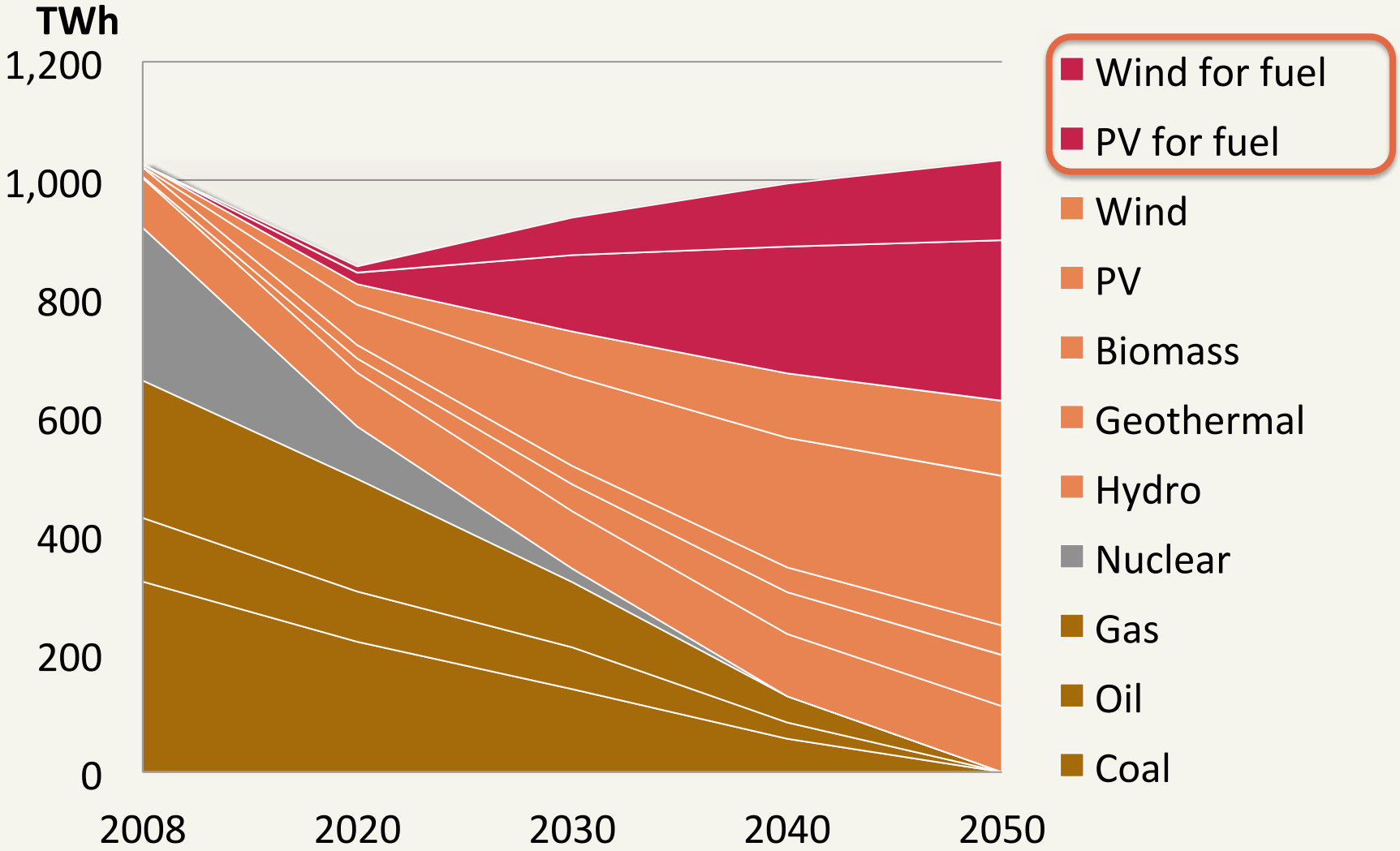
The scenario does not use up the potentials of PV and wind.

Electricity (excl fuel use)

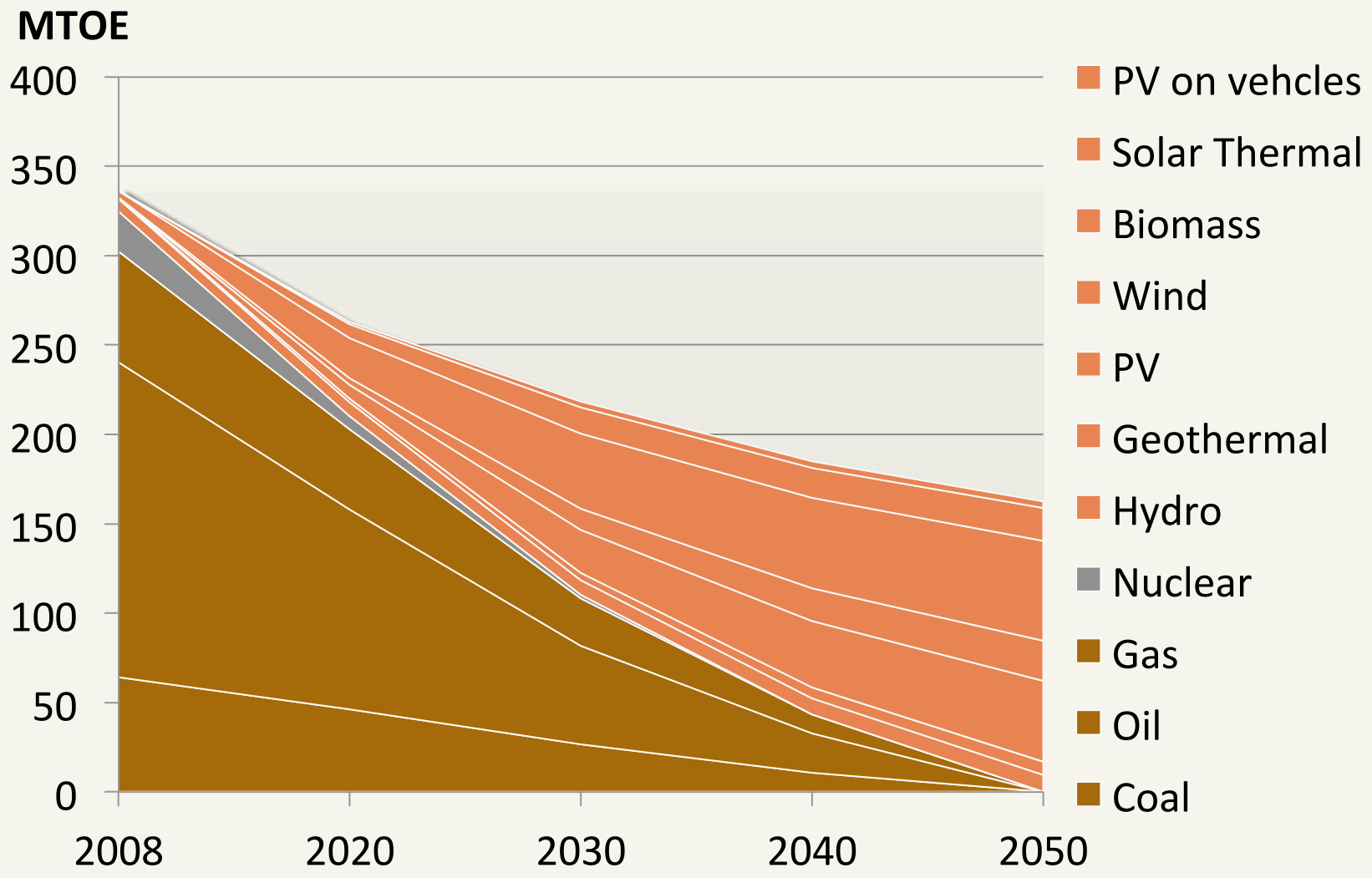


Electricity incl fuel use

For hydrogen for as fuels (heat)



Energy Demand-Supply (Final Energy Consumption Basis)



Derived Targets for EE and RES

Targets for Energy Efficiency (Final Energy Consumption)

	2020	2030	2040	2050
To 2008	-21.0%	-33.9%	-42.8%	-51.8%

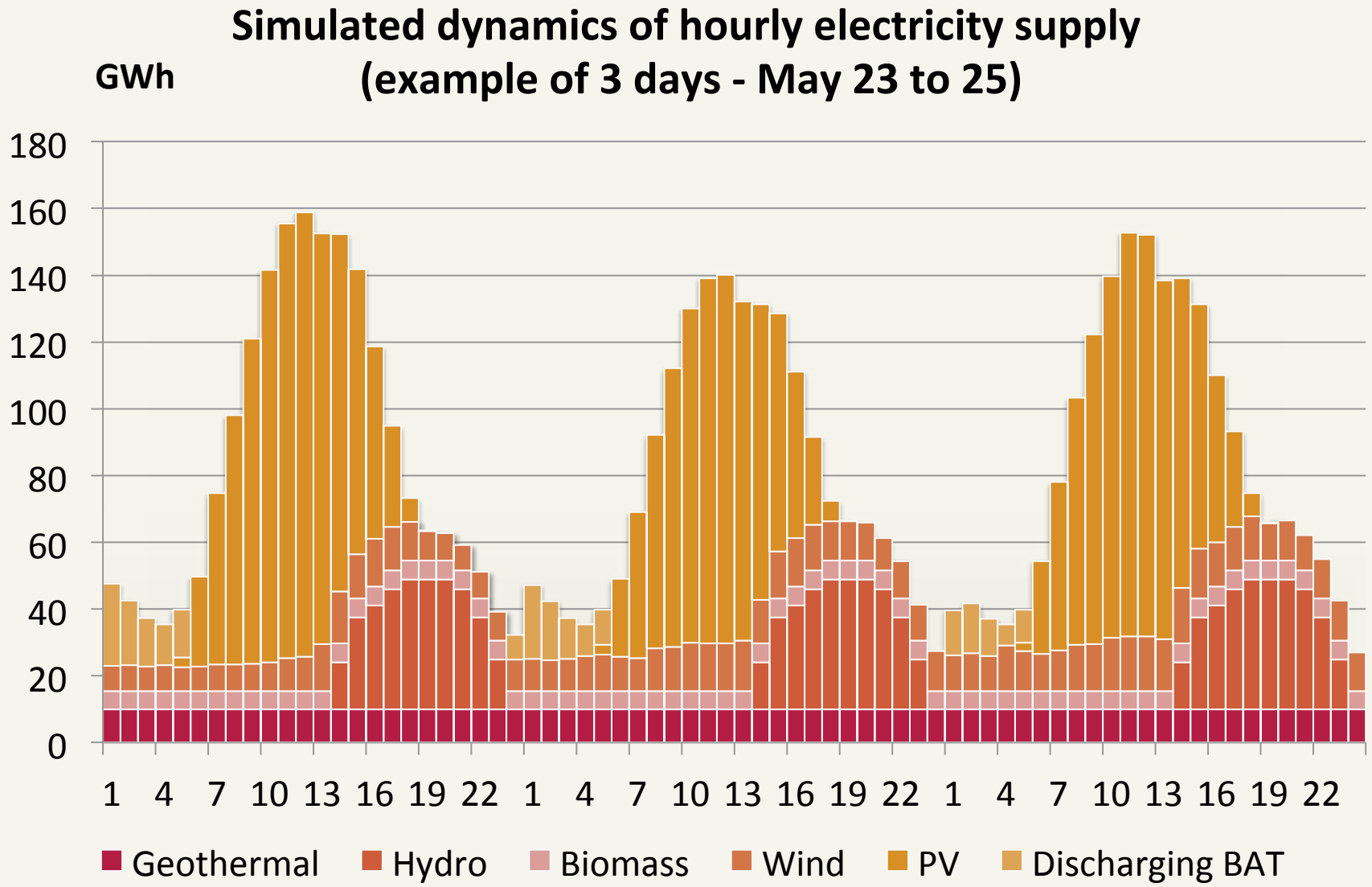
Targets for Renewables (% of Electricity)

	2008	2020	2030	2040	2050
Share in Electricity excl fuel use	11%	29%	54%	81%	100%
Share in Electricity incl fuel use	11%	32%	63%	87%	100%

Targets for Renewable Fuel and Heat (% of non-electricity)

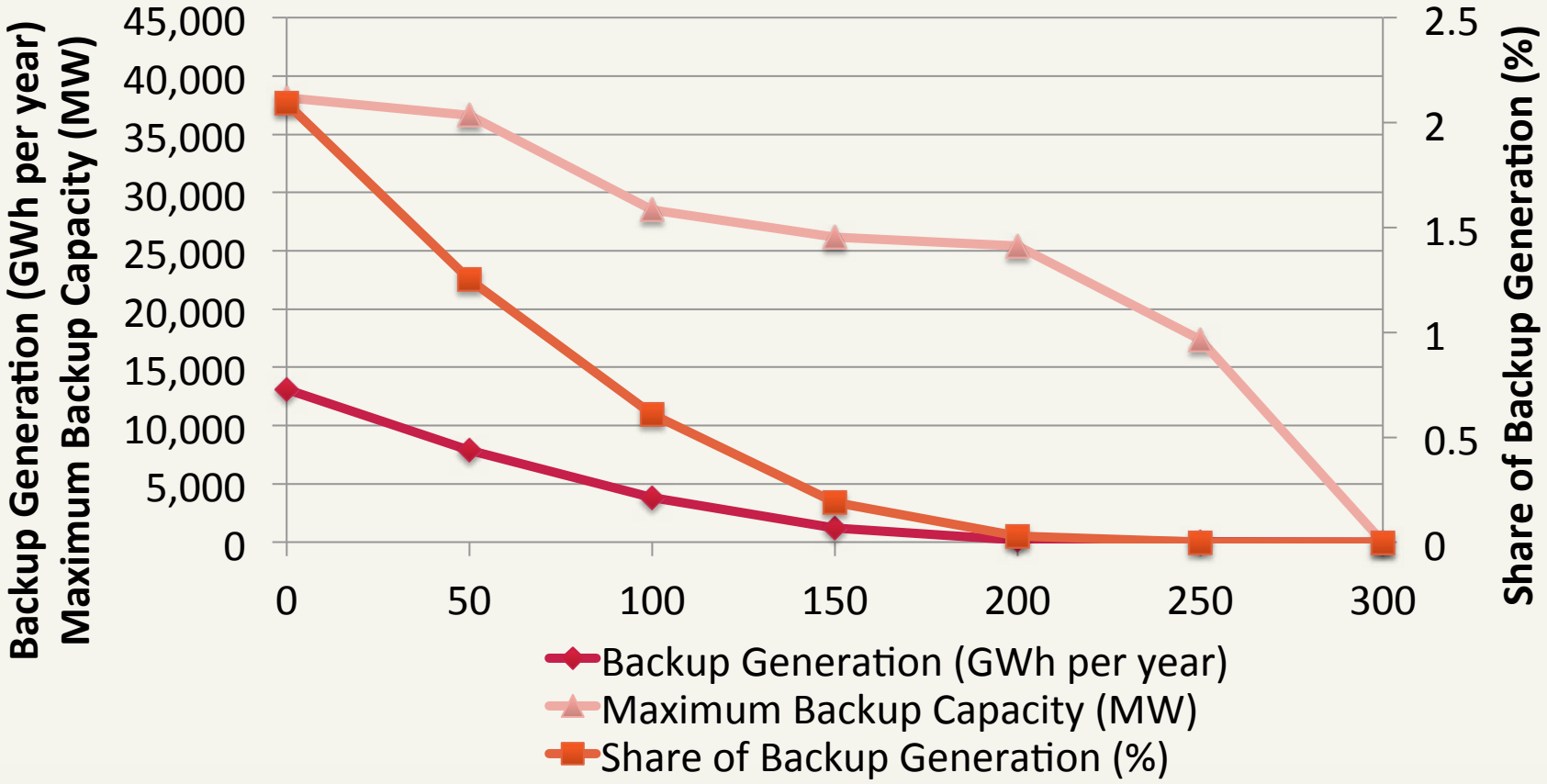
	2008	2020	2030	2040	2050
Share in Fuel and Heat	1%	15%	38%	56%	73%

Electricity Demand-Supply in 2050



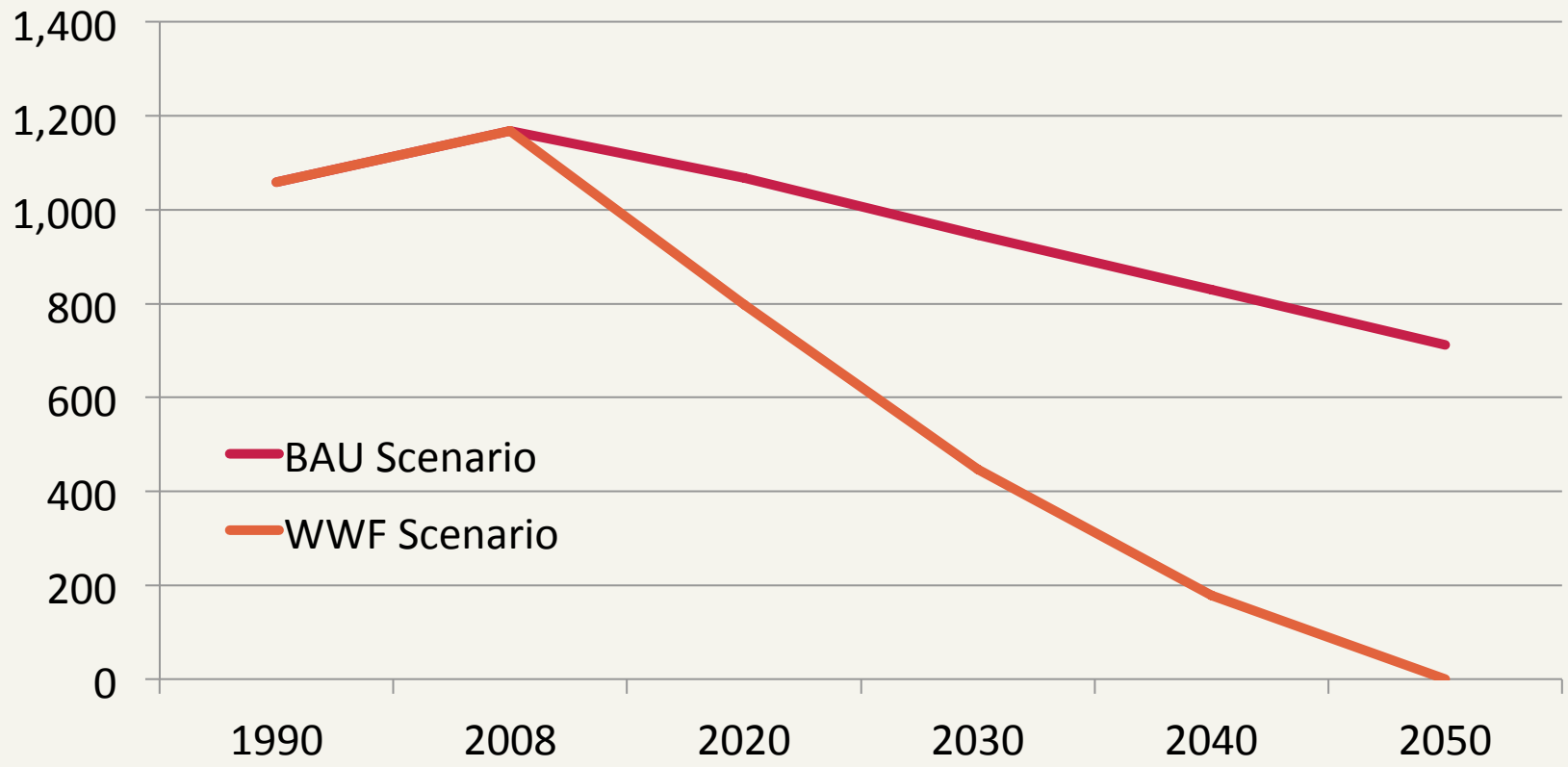
Need backup capacity and batteries?

Backup Capacity ⟷ Battery Capacity



Sufficient battery capacity (300GWh) eliminates the necessity of backup generation even in the case of 100% RES

CO2 Emissions from Energy Use



- Compared to 1990 levels
- Not all GHGs

	2008	2020	2030	2040	2050
BAU	+10%	+1%	-11%	-22%	-33%
WWF	+10%	-25%	-58%	-83%	-100%

Challenges Ahead

- *Ambition challenge*: Can we set ambitious targets for energy efficiency and renewables?
- *Policy challenge*: Do we get FIT design right?
- *Grid challenge*: Can we create effective and integrated grid system, where renewables can get boosted up?
- *Heat/Fuel challenge*: Can we successfully promote renewable heat use? Can we secure sustainable biomass supply?