



make the future Heat pump

~The world demands a heat pump~



International Organizations Related to Energy Countermanding Global Warming

International organizations involved in preventing global warming are increasingly turning their attention to the role that heat pumps play.

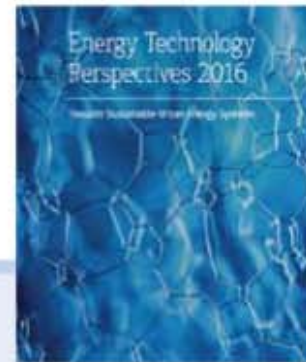


International Energy Agency

International Energy Agency: Established in 1974 for the purpose of protecting member nations from the risk of disruptions in oil supplies. Its current missions include energy security, solving global environmental issues, and economic development. Headquartered in Paris, and has 28 member countries.

June 2016
Energy Technology Perspectives Published

* First edition published in 2006



* The illustrated cover design for the 2016 edition.



International Renewable Energy Agency

International Renewable Energy Agency: Established in 2011 for the purpose of promoting the widespread and the sustainable use of renewable energy (solar, wind, biomass, geothermal, hydro, etc.). Its main activities are the analysis and validation of renewable energies, policy advisory services, and the support of capacity development for member nations. Headquartered in Abu Dhabi (UAE), and has 131 member countries and EU.

March 2016
Road Map for Renewable Energy (REmap2030) Published

* First edition published in 2014



* Website images

Energy Technology Perspectives (2016)



* The illustrated cover design for the 2016 edition.

What is Energy Technology Perspectives (ETP) ?

Since 2006, Energy Technology Perspectives (ETP) has been published approximately once every two years in response to a request issued during the G8 Summit for scenarios and strategies for solving the world's energy and environmental issues. The report contains information required for a future of safe, low-carbon energies, and is offered to policy-makers in various countries.

- 1 By the year 2050, buildings will play a vital role in energy saving and reducing greenhouse gas emissions to substantial levels. Buildings in urban areas accounted for 62% of all energy consumed by the buildings sector in 2013, and this is forecast to exceed 70% by 2050 in the event of a 6°C rise in temperature (at present, a 6°C rise is inevitable).
- 2 Air-conditioning will play an important role in supporting future energy saving measures in the buildings sector, and urban areas hold several keys to lowering demand for heating and cooling energy. Moving ahead with plans to save heating and cooling energy, which accounts for approximately 40% of energy savings in the buildings sector for cities, will enable urban areas to cover 70% of the energy saving for the entire globe's building sector by 2050.
- 3 If we can promote aggressive energy-efficiency policies in the buildings sector, it would enable us to reduce energy consumption within the urban buildings sector by 30% by 2050 in contrast to the scenario involving a 6°C rise in temperature. If OECD nations would promote energy saving in existing buildings in addition to developing buildings that consume low levels of energy and installing high-efficiency equipment, it would be possible to cut energy consumption by one-third by 2050 in contrast to the scenario involving a 6°C rise in temperature.
- 4 The reason why vast reductions in greenhouse gases can be expected from city buildings amid a temperature rise scenario of 2°C is because cooling and heating accounts for the majority of overall reductions (at 60%), followed by water heating (at 22%). Although non-OECD nations and OECD nations share approximately the same levels of energy consumption in urban areas, there is a distinct difference between them. OECD nations consume approximately 60% more energy for heating purposes than non-OECD nations. Conversely, the highest percentage of overall energy consumption in non-OECD nations is used in the kitchen and for heating water.

HEAT PUMP SYSTEM

Notes Regarding Heat Pumps

	<p>In contrast with 2013 figures, it has been forecast that by 2050, demand for energy by the buildings sector in urban areas will increase to 70%, in the event of a 6°C rise in temperature (at present, a 6°C rise is inevitable), but it is possible to reduce energy consumption in the field of water heating by 25% in the event of a 6°C temperature rise, of water heating by 25% in the event of a 6 ° C temperature rise.</p>		<p>District heating in Denmark, Norway, the United Kingdom and other cold-climate regions use a combination of solar power, geothermal power and other forms of renewable energy in combination with heat pumps, in order to attain low-carbon societies and ZEB societies.</p>
	<p>Detached houses in Stockholm have a high energy-consumption rate (70kWh to 110kWh/m²). The main reason for this is that approximately 50% of detached houses use heat pumps for heating.</p>		<p>District heating in Stockholm is the largest in Sweden, although 60% of the heat supplied comes from biomass and waste fuels, with 25% provided by heat pumps.</p>

REmap 2030 (Road Map for Renewable Energy by 2030)



What is REmap2030?

REmap2030 is a plan to increase the rates at which renewable energies are used around the world between 2010 and 2030. REmap determines the realistic potential for countries, regions and the world to scale up renewable energies in order to ensure an affordable and sustainable energy at present and in the future.

It assesses the potential of renewable energies for each individual area in various countries, and represents the first ever attempt to spread these initiatives throughout the entire world. (Source: IRENA Website)

REmap 2030 (2016 Edition)

- It is possible to increase the rate at which renewable energies are used by 2030 (18.4% as of 2014), and when this is combined with the widespread use of energy technologies emphasizing energy efficiency, raising the ratio of renewable energies to 30% (maximum 36%) by 2030 is feasible. However, in order to achieve this, we must establish intensive measures for the transport, buildings and industry sectors immediately.
- Investment into the fields of electricity generation, heating and cooling, and biomass fuel must be increased from the present \$360 billion (2015) per year to \$1.3 trillion per year in order to double the use of renewable energy by 2030. The cost-to-benefit effects of the investment required to double renewable energy will greatly exceed the sum invested by alleviating the adverse effects of atmospheric pollution on human health and damage to crops caused by global warming, etc.

- If the five countries with the highest possibility of utilizing renewable energies, China, US, India, Brazil and Russia, would actively embrace these initiatives, it would result in renewable energies accounting for more than 50% of the total by 2030. It would also contribute to 14% of the entire EU and approximately 10% of all countries in Africa.

An overall image of the main sectors likely to embrace the widespread use of renewable energy utilization technologies advocated by IRENA as we move toward 2030

	Units	2013	Reference Case ^{*1}	REmap ^{**}	Doubling ^{**1}
POWER					
Hydropower	GW	1170	1830	1995	2245
Wind	GW	370	1070	1990	2500
Solar PV	GW	175	780	1760	2520
Bioenergy	GW	95	250	430	430
Geothermal	GW	12	42	92	152
Ocean	GW	0.5	2	7	7
TRANSPORT					
Electric Vehicles	million vehicles	0.8	60	160	173
2/3 wheelers	million vehicles	200	500	900	900
Bioliqids	billion litres	129	250	500	520
Biomethane	billion m ³	0.01	0.3	0.9	24

	Units	2013	Reference Case ^{*1}	REmap ^{**}	Doubling ^{**1}
INDUSTRY					
Bioenergy heat (incl. CHP)	EJ/yr	8	11	17	18
Geothermal (direct heat)	EJ/yr	0.02	0.05	0.4	0.4
Heat Pumps	million units	0.2	3	18	34
BUILDINGS					
Bioenergy – traditional	EJ/yr	35	21	0	0
Bioenergy – advanced cooking	EJ/yr	2.5	4	13	13
Geothermal (direct heat)	EJ/yr	0.3	0.7	0.8	0.8
Heat Pumps	million units	4	32	42	102

Expectations are high for a 25-fold to 150-fold increase in the use of heat pumps over current figures!

*1. Reference Case: Estimated values if each nation implements current plans and policies.
 *2. REmap: Estimated values if each country adopts initiatives that place the priority on adopting renewable energy utilization technologies over and above the technologies included in each nation's current plans and policies (in the case of a comparative 30%).
 *3. Doubling: Estimated values if greater levels of technological efficiency and social change are achieved in addition to the levels laid down in the REmap framework (in the case of a comparative 36%).

HEAT PUMP SYSTEM Notes Regarding Heat Pumps

High expectations for heat pumps are clear from the fact that the notes regarding heat pumps are found in more than fifteen sections in REmap2030 which aims at doubling the current levels of renewable energy utilization. REmap2030 explains the use of heat pumps for low-temperature processes in factories, and increased efficiency in district heating that uses heat pumps in buildings, etc.



Recommendations taken from Chapter 3: Solutions in REmap2030

RENEWABLE APPLICATION IN INDUSTRY

Industry

- There is enormous potential for factories to use heat pumps (electrical), solar heat, and geothermal heat for mid- to low-temperature processes (400°C or less).
- It is necessary to spread the word (to policy makers) regarding the incentives provided by installing heat pumps and the effectiveness obtained from low-temperature processes.

RENEWABLE HEATING AND COOLING IN BUILDINGS

Buildings

- For district heating and cooling, and factories, it is important to effectively combine the use of renewable energy utilization technologies that use biomass, solar heat, geothermal heat, and heat pumps, etc.
- It is necessary (for policy makers) to make the best possible use of heating and cooling facilities utilizing solar-heated water and heat pumps, as well as solar batteries.

**Suggested National Targets Set by AHPNW Member Nations*¹ and Other Major Nations
(Intended Nationally Determined Contributions)**

Country	Objective	Date of Submission
 Japan	Greenhouse gas emissions reduced by 26% by 2030 in contrast with 2013 figures.	July 17, 2015
 India	Greenhouse gas emissions reduced by 33% to 35% of the GDP by 2030 on condition of access to unlimited clean technology and financial support.	October 1, 2015
 Indonesia	Unconditional target of greenhouse gas emissions being reduced by 29% by 2030 in contrast with BAU* ² . Emissions reduced by 41% by 2030 in comparison with BAU on condition of access to international support.	September 24, 2015
 South Korea	Greenhouse gas emissions reduced by 37% by 2030 in contrast with BAU.	June 30, 2015
 Thailand	Unconditional target of greenhouse gas emissions being reduced by 20% by 2030 in contrast with BAU. Conditional target of emissions reduced by 25%.	October 1, 2015
 China	CO ₂ emissions to peak by 2030. Maximum effort will be made to stop the CO ₂ emissions from reaching the peak levels at an earlier stage. CO ₂ emissions reduced by 60% to 65% of the GDP compared to 2005 figures. The percentage of non-fossil fuels to be increased by 20% in the primary energy consumption sector. Forest growth to be increased by 4.5 billion square meters compared to 2005 figures.	June 30, 2015
 Vietnam	Unconditional target of greenhouse gas emissions being reduced by 8% by 2030 in contrast with BAU. Reduced by 25% in contrast with BAU on condition of international support via the implementation of new mechanisms established in accordance with bilateral and multilateral cooperation and international climate agreements.	September 29, 2015
 EU	Greenhouse gas emissions reduced by at least 40% within the region by 2030 compared to 1990 figures.	March 6, 2015
 Australia	Greenhouse gas emissions reduced by 26% to 28% by 2030 compared to 2005 figures.	August 11, 2015
 Canada	Greenhouse gas emissions reduced by 30% by 2030 compared to 2005 figures.	May 15, 2015
 Saudi Arabia	Reduced to the equivalent of 130 million tons of annual CO ₂ emissions by 2030 via contributions to economic diversification and adaptation.	November 10, 2015
 United States	Reduced by 26% to 28% by 2025 compared to 2005 figures. (Maximum effort will be made to reduce this by 28%.)	March 31, 2015
 Brazil	Greenhouse gas emissions reduced by 37% by 2025 compared to 2005 figures.	September 28, 2015
 Russia	Long-term indicators for constraining anthropogenic greenhouse gas emissions by 70% to 75% compared to 1990 figures by 2030. (Reduced by 25% to 30% over 1990 figures by 2030.)	April 1, 2015

(Source: Climate Action Network Japan Web site)

*1. AHPNW: Asian Heat Pump and Thermal Storage Technologies Network (nations enclosed in the box above)

*2. BAU: Business as usual (natural progression without specific measures being implemented)