

The views expressed in this presentation are the views of the author/s and do not necessarily reflect the views or policies of the Asian Development Bank, or its Board of Governors, or the governments they represent. ADB does not guarantee the accuracy of the data included in this presentation and accepts no responsibility for any consequence of their use. The countries listed in this presentation do not imply any view on ADB's part as to sovereignty or independent status or necessarily conform to ADB's terminology.

The ADB logo, consisting of the letters "ADB" in a white serif font on a dark blue square background.

BENEFITS OF CENTRALIZED HEATING - COOLING SOLUTIONS FOR LOW CARBON DEVELOPMENT IN ASIAN CITIES

ALFREDO BAÑO LEAL

SENIOR ENERGY SPECIALIST

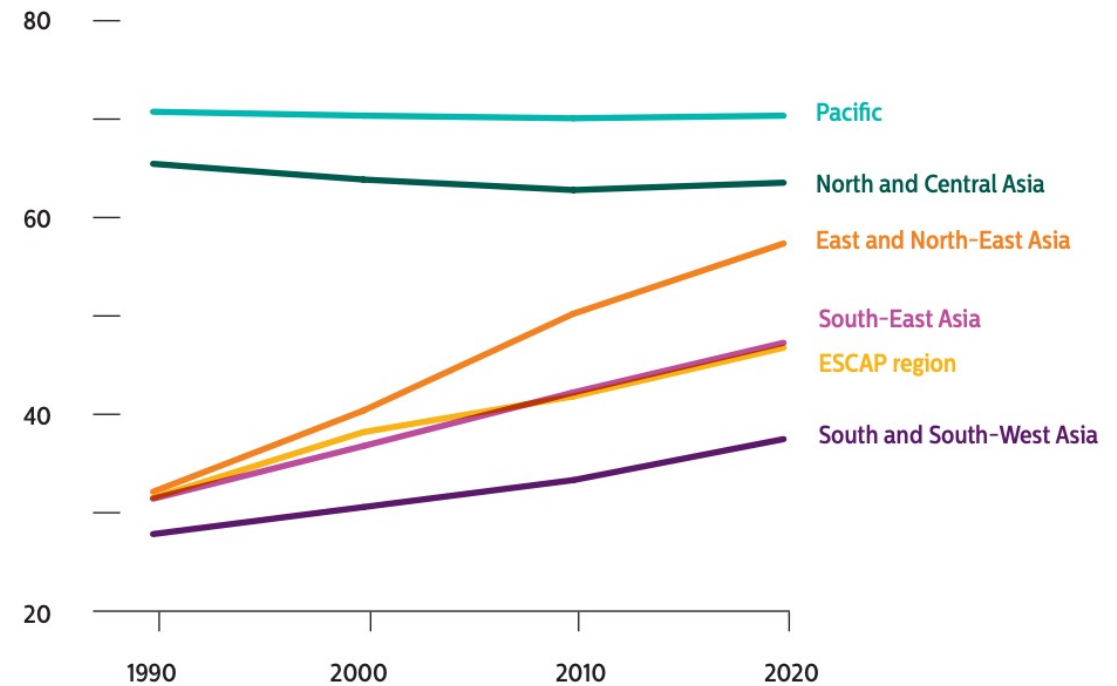
SUSTAINABLE INFRASTRUCTURE DIVISION, EARD

ASIAN DEVELOPMENT BANK

Growing Urbanization

- From 0.75 billion in 1990 to 2.2 billion in 2020 (28% of world's pop.)
- 21 out of 32 megacities (>10 million people) are located in Asia
- 68% of the world population projected to live in urban areas by 2050

Figure 1 **Urbanization in Asia and the Pacific across subregions, 1990–2020**



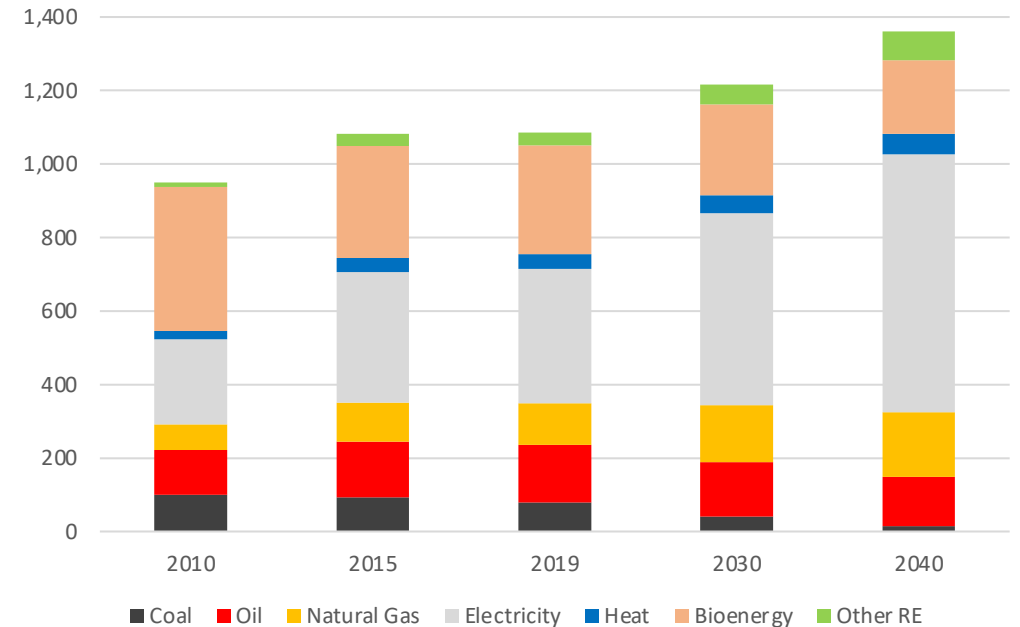
Note
Source

The trends for *South-East Asia* and *ESCAP region*, as a whole, are very similar.
United Nations, Department of Economic and Social Affairs, Population Division (2012).
World Urbanization Prospects: The 2011 Revision. CD-ROM Edition - Data in digital form (POP/ DB/WUP/Rev.2011).

Urban Energy

- In 2013, the world's cities consumed about 64% of global primary energy and produced 70% of the planet's CO₂ emissions – IEA
- Buildings consume about 1/3 of urban energy, and expected to increase due to increased cooling demand

**Final Energy Consumption in Buildings Sector
in Asia Pacific, 2010-2040e (Mtoe)**



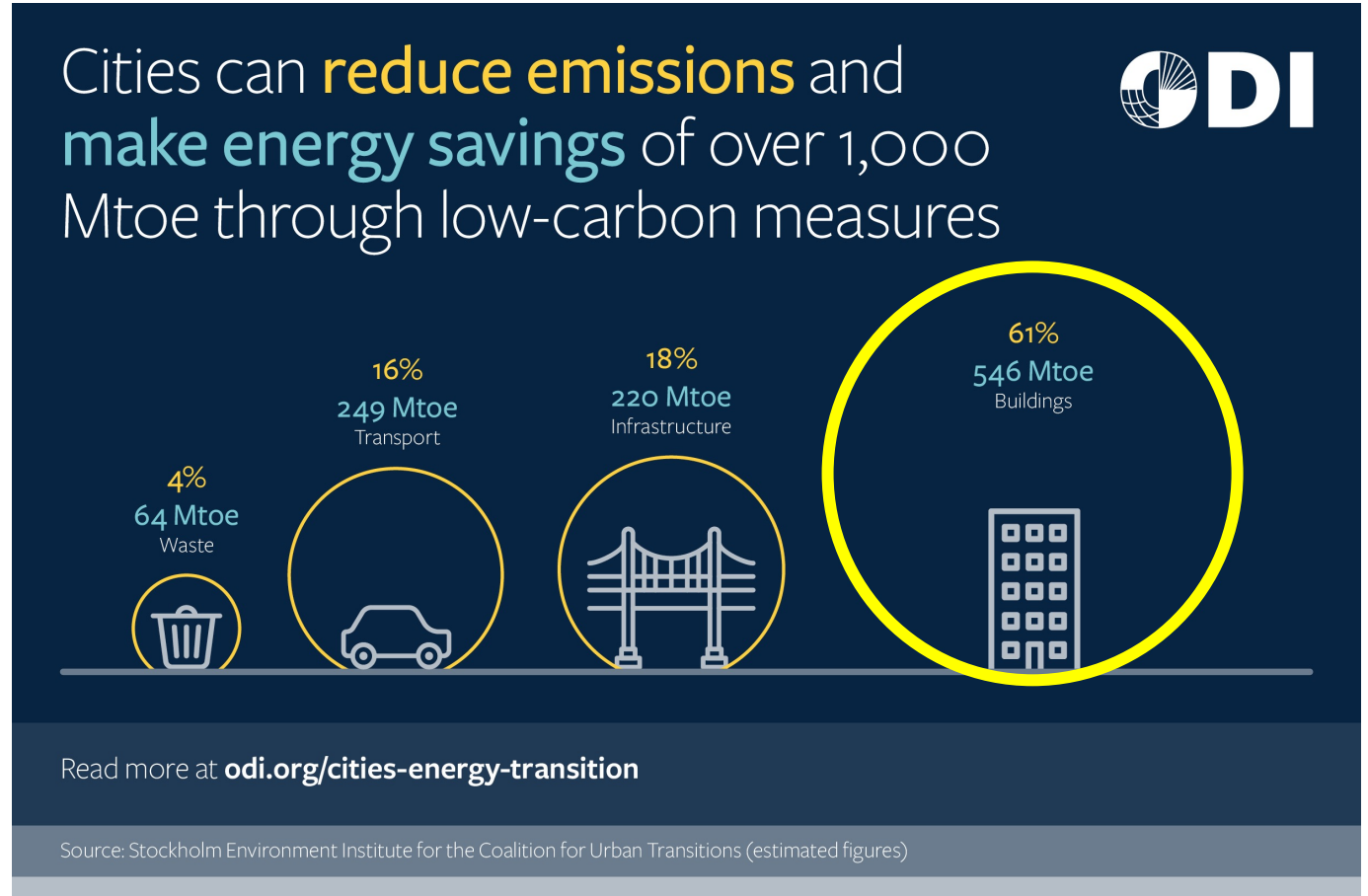
Source: IEA World Energy Outlook 2020

Urban Energy

Buildings are the low hanging fruit for emission reduction in cities!

Where are the savings?

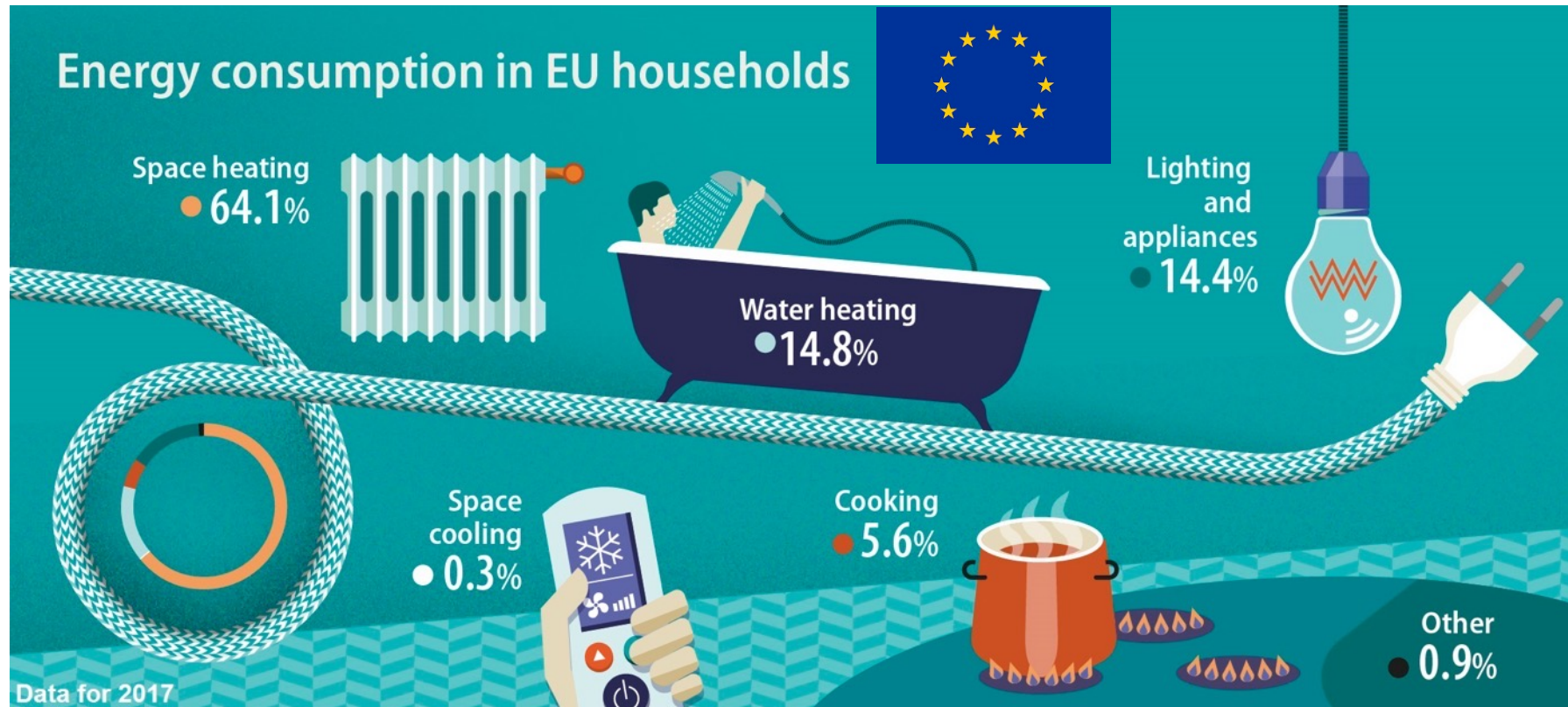
In thermal energy: heating and cooling spaces



1,000 Mtoe = Total energy consumption of buildings in APAC in 2013

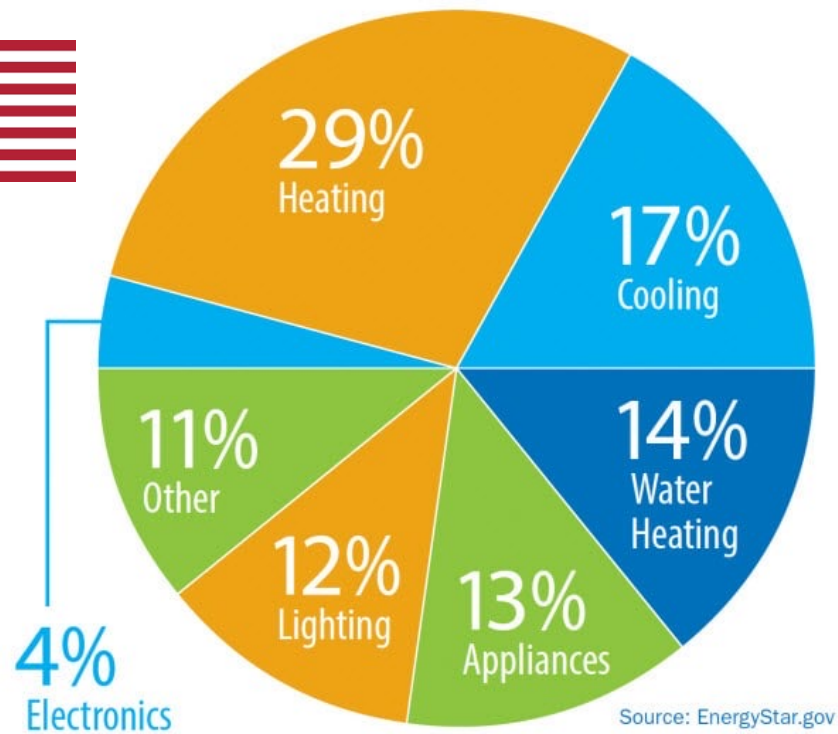
Buildings Energy Use

Final Energy Consumption in the Residential Sector by End-use in Europe, 2018

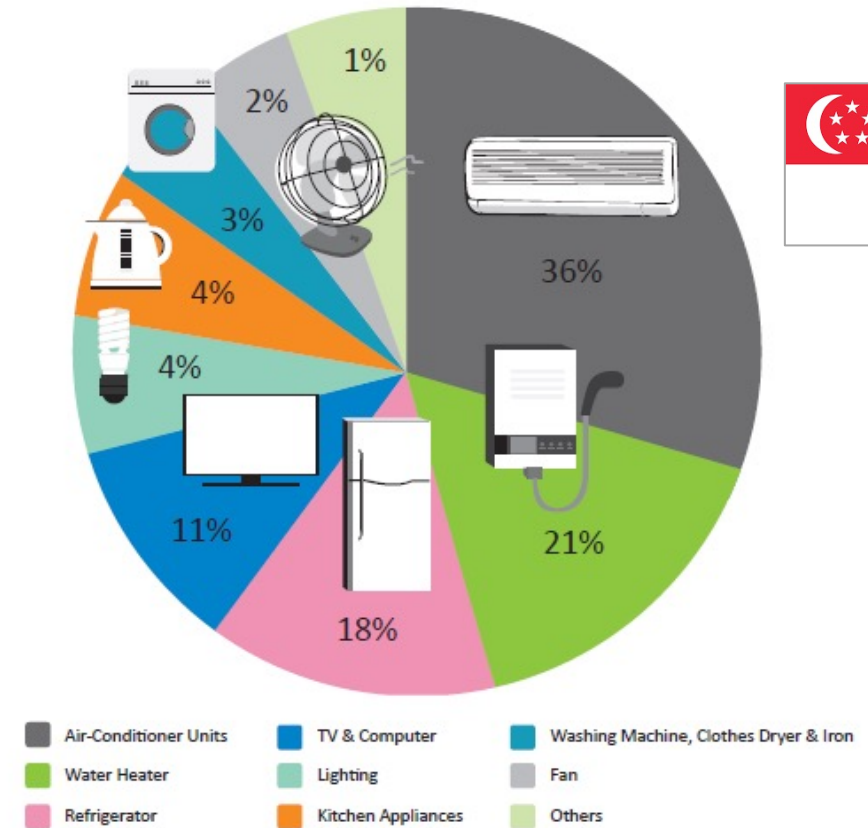


Buildings Energy Use

Energy Use Breakdown
(Based on average use per household)



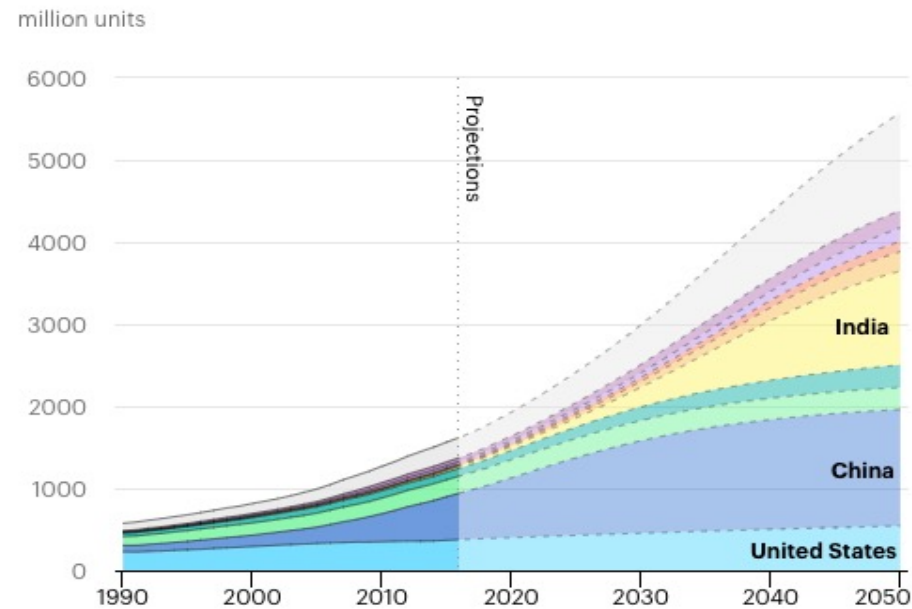
Household Energy Consumption Profile



Source: Household Consumption Survey 2012
www.e2singapore.gov.sg

Cooling Buildings

Global air conditioner stock, 1990-2050

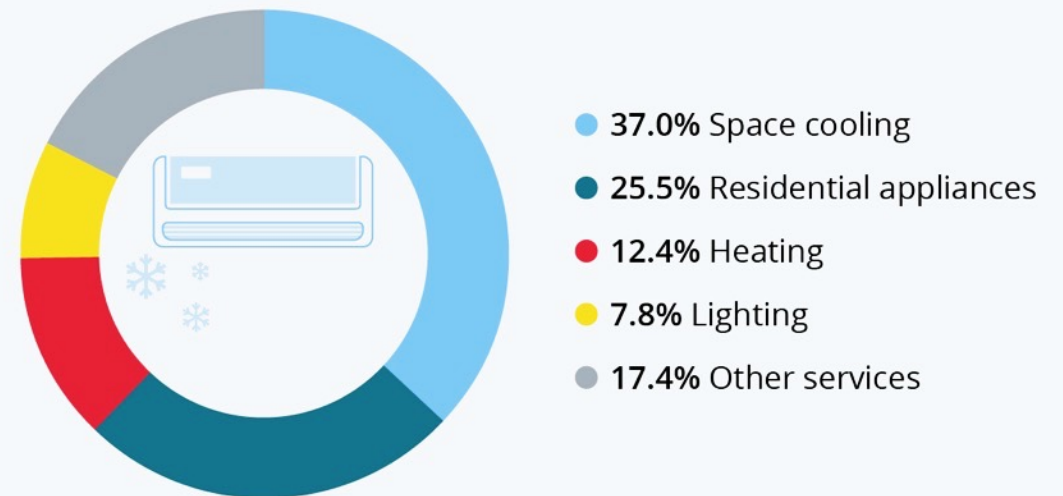


IEA. All Rights Reserved

United States China Japan and Korea European Union India Indonesia Mexico Brazil Middle East Rest of world

Air Conditioning Biggest Factor in Growing Electricity Demand

Global electricity demand growth from 2018 to 2050, by energy use category



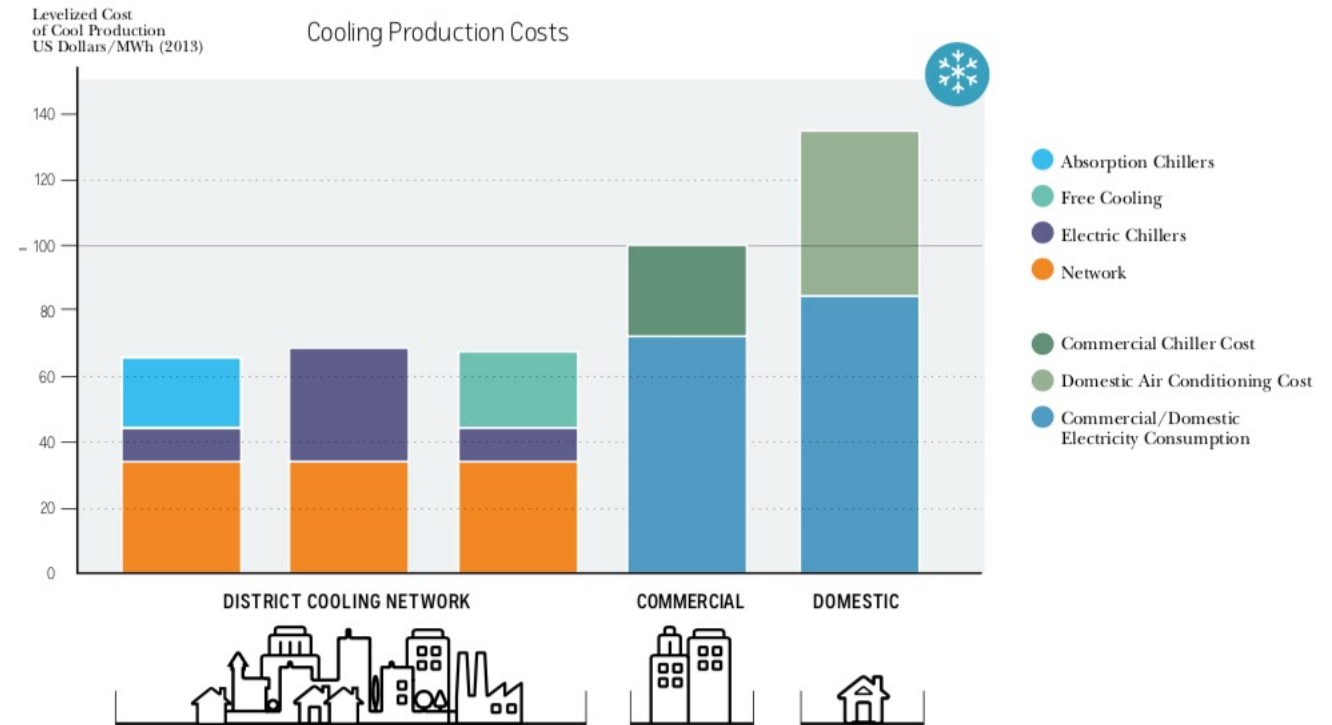
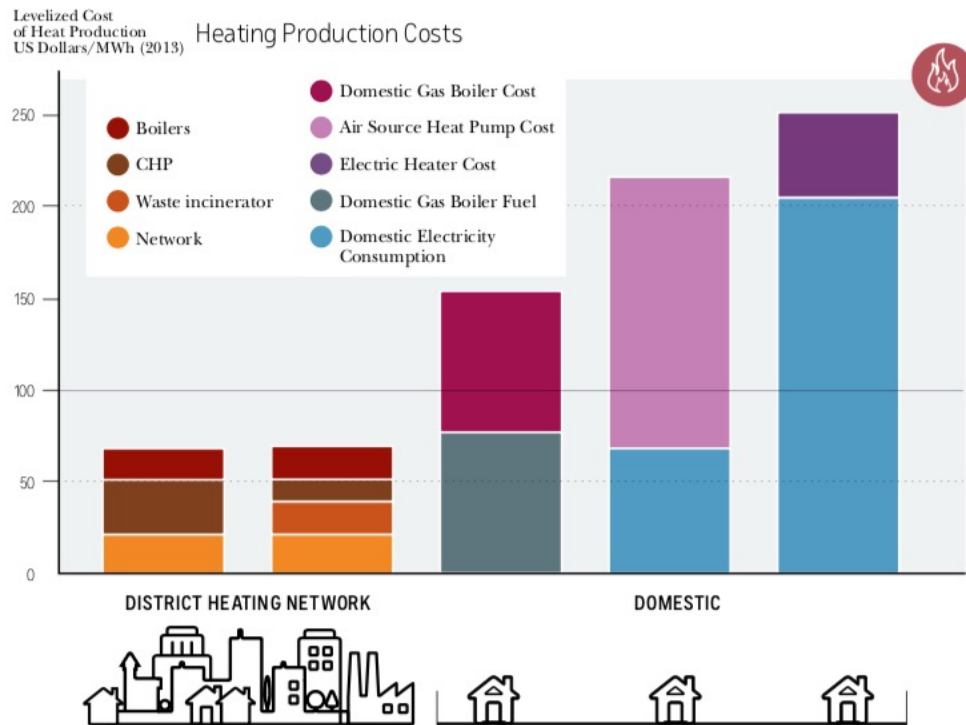
Source: International Energy Agency



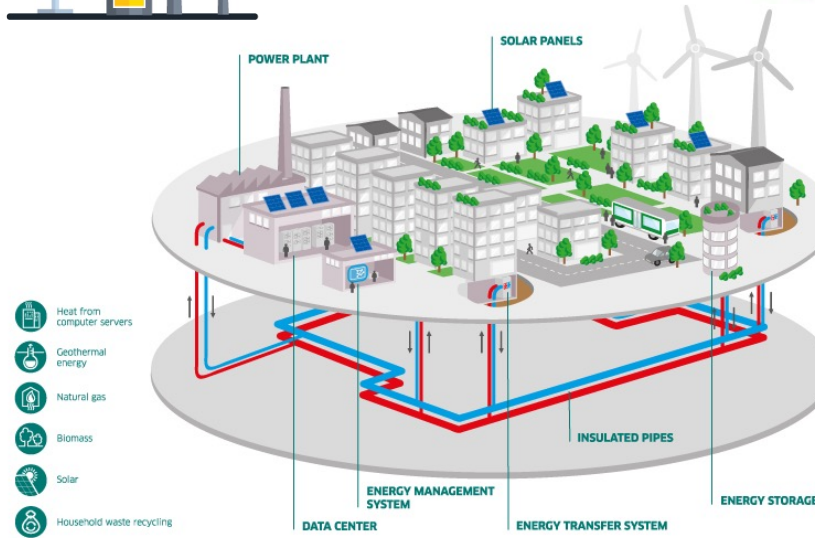
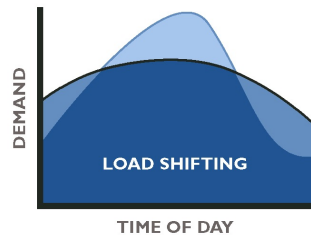
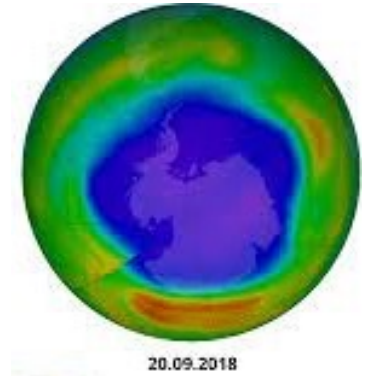
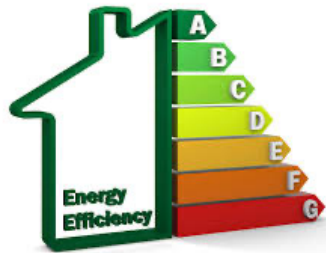
statista

District vs Decentralized

Levelized Costs of District Heating and Cooling vs. Decentralized Production



Benefits of district heating/cooling systems



Cool Buildings



House in Singapore. 2013

Cool Buildings



Marina Bay in Singapore. 2013

Thank you!

谢谢