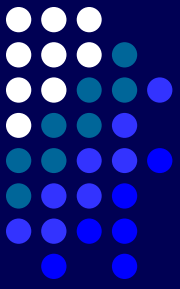


The "Other Geothermal" Energy

June 2017

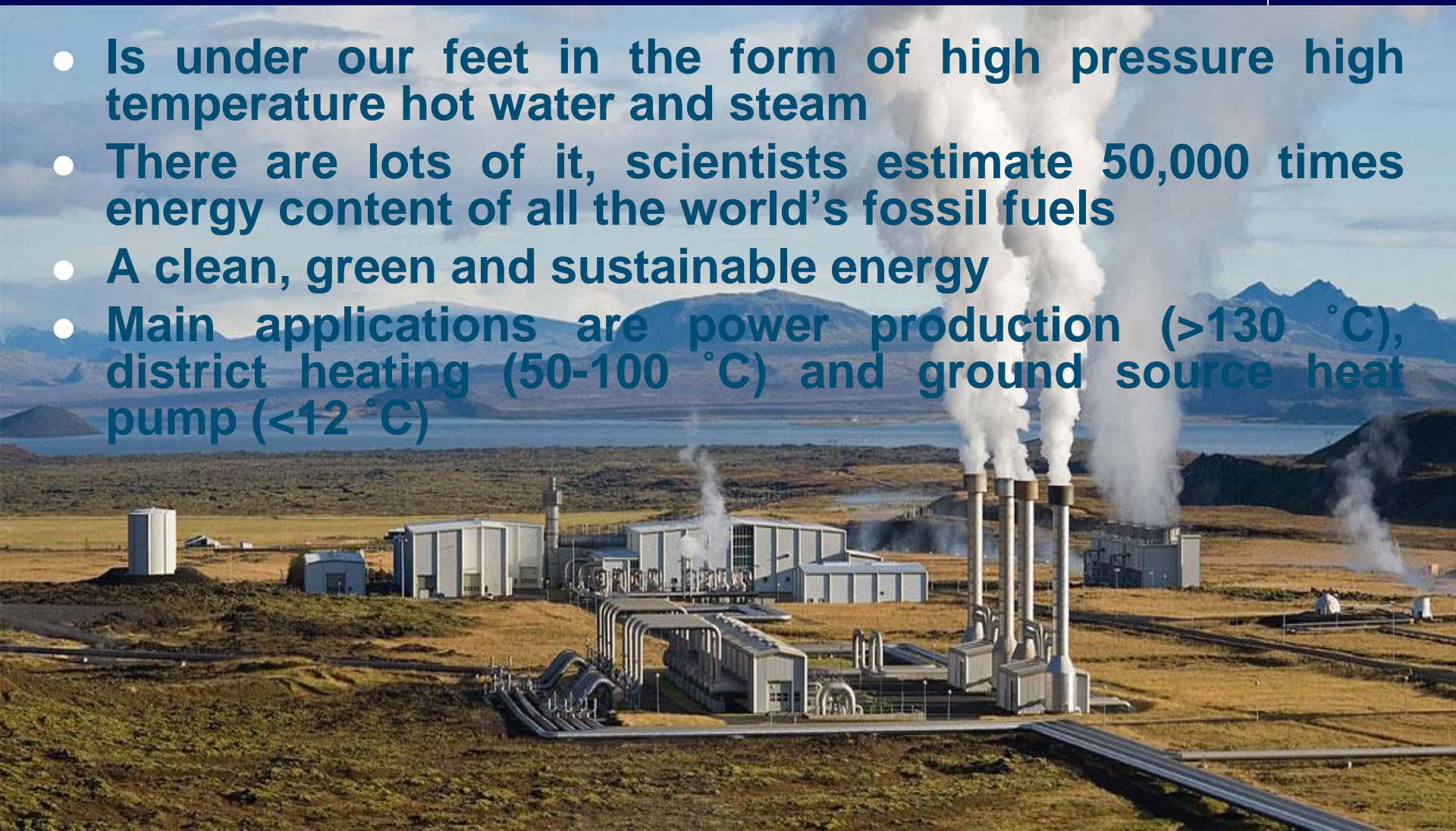
Lin Lu

**Energy Specialist
Asian Development Bank**

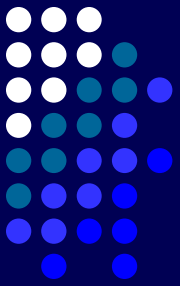


WHAT IS GEOTHERMAL ENERGY

- Is under our feet in the form of high pressure high temperature hot water and steam
- There are lots of it, scientists estimate 50,000 times energy content of all the world's fossil fuels
- A clean, green and sustainable energy
- Main applications are power production ($>130\text{ }^{\circ}\text{C}$), district heating ($50\text{-}100\text{ }^{\circ}\text{C}$) and ground source heat pump ($<12\text{ }^{\circ}\text{C}$)

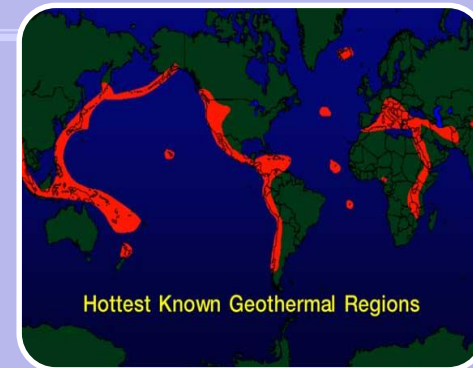
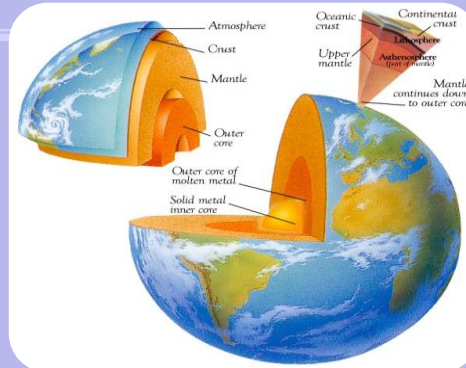
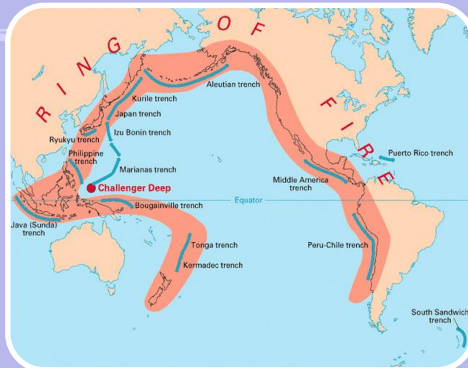
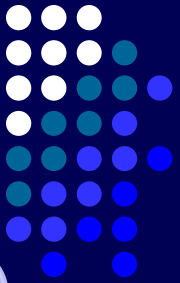


HEATING AND GLOBAL WARNING



- ❖ 40% of fossil fuel is burnt today for cooling and heating
 - Direct use of geothermal for district heating or cooling is one of the fastest and most effective ways to replace fossil fuels
- ❖ Higher quality of life: cleaner air, better health, higher standards of living
- ❖ Can be replicated in the areas with rich geothermal endowment
- ❖ Most efficient way in fighting against global warning

THE GEOTHERMAL RESOURCE



Shallow Ground Geothermal

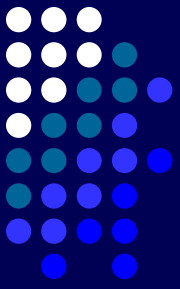
- Heat pump – space heating

Hot Dry Rock

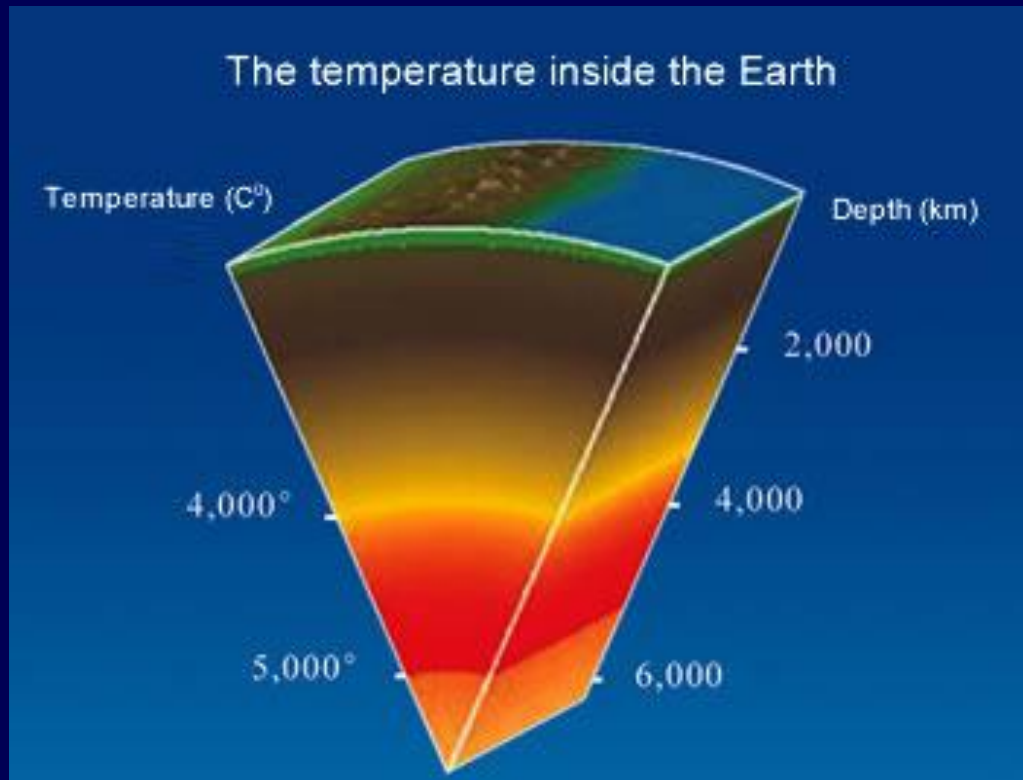
- Still in research and development stage

Mid-Deep Well Geothermal

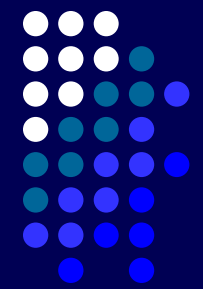
- District heating and cooling



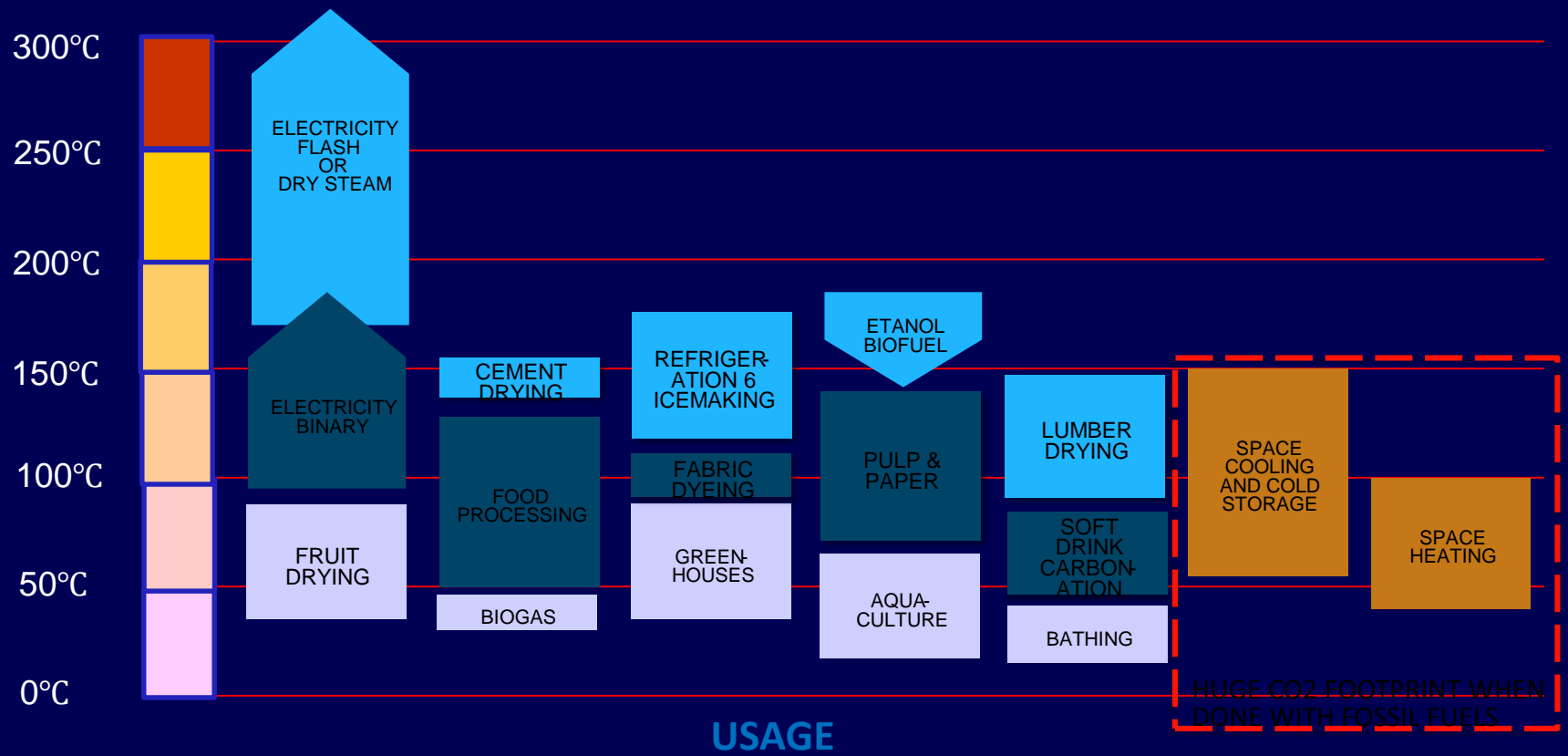
HOW GEOTHERMAL ENERGY IS CAPTURED



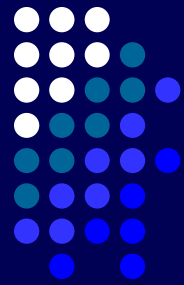
- Geothermal springs for power plants
- Direct use of geothermal heat
- Ground-source heat pump



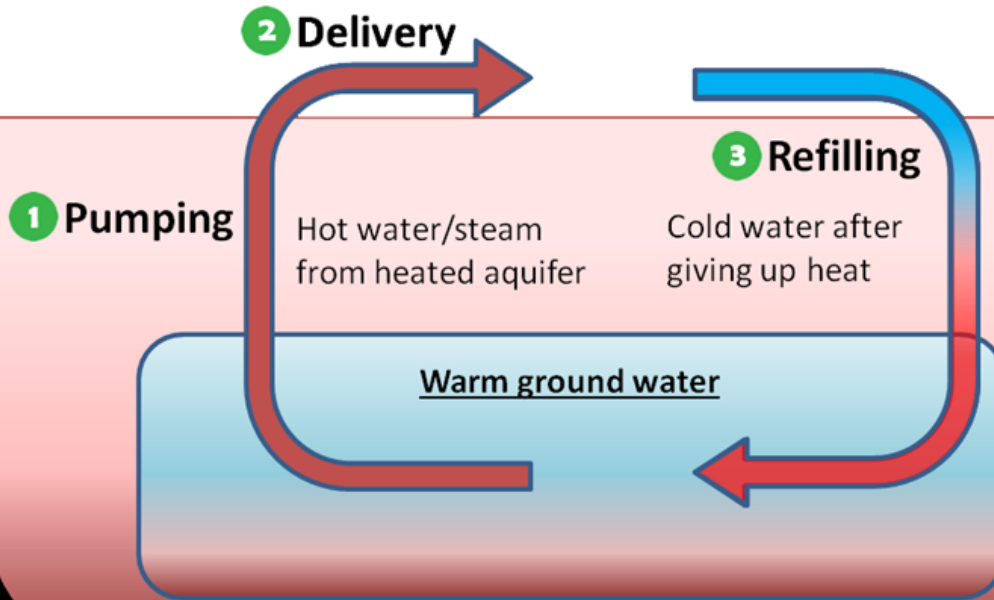
WHAT CAN WE DO WITH GEOTHERMAL ENERGY



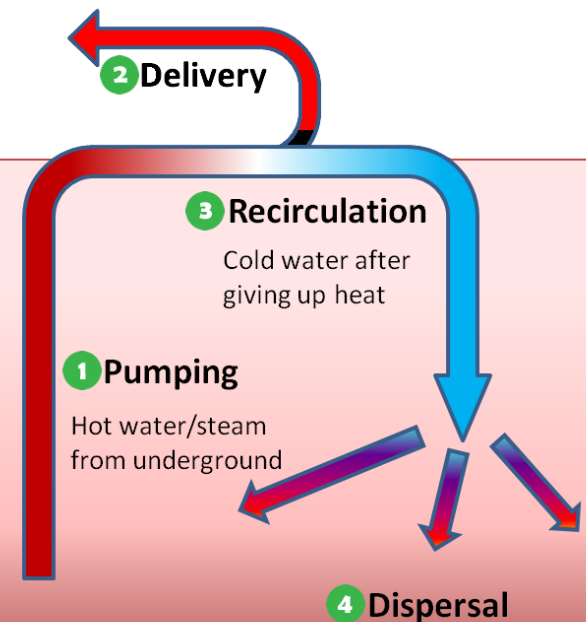
HOW DOES DISTRICT HEATING WORK



Geothermal Direct Use

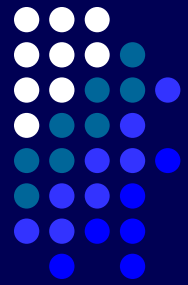


Deep Geothermal

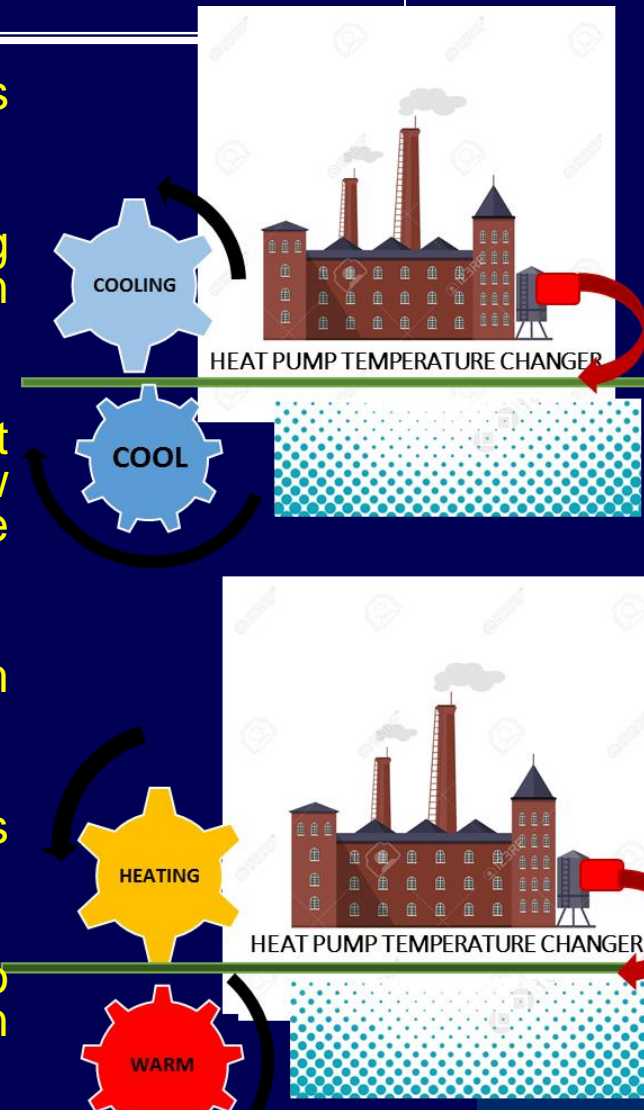


HOW DOES DISTRICT HEATING WORK

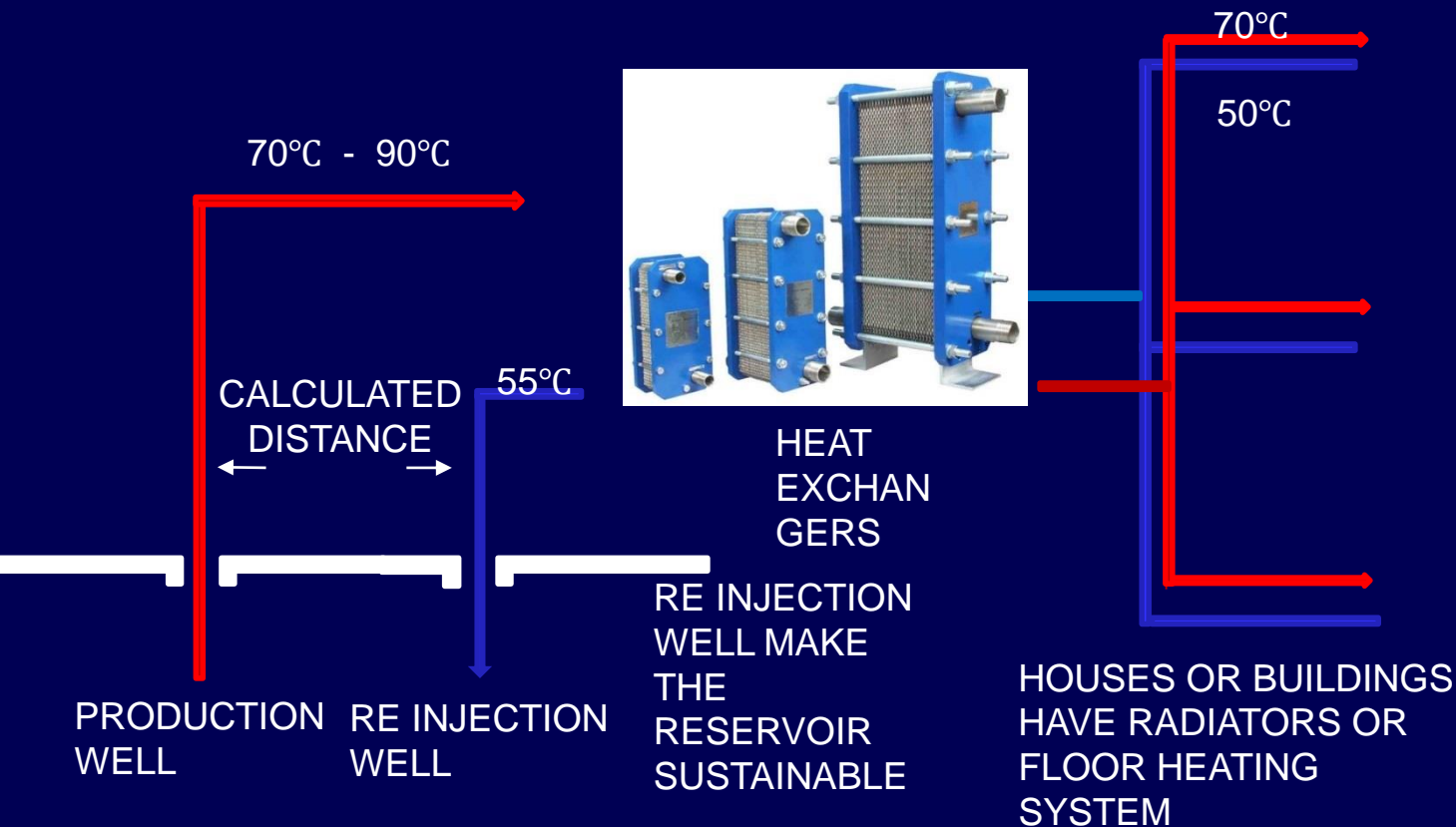
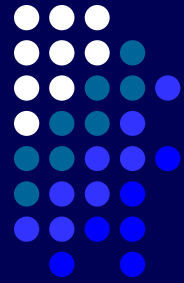
-GROUND SOURCE HEAT PUMP



- GSHPs are electrically run systems that are sometimes referred to as geo-exchanges
- While not enjoying the effects of scale District Heating offers, it can provide a very valuable solutions on smaller scale
- GSHP's uses Geothermal Energy from heat at environmental temperature at approx. 3 meters below the surface. The ground maintains stable temperature between 11-13°C
- GSHP can be used to heat up houses or cool them down via heat exchanger
- Cooling provided by heat exchange with cold ground is more efficient than air conditioning
- The system can be used with conventional systems to save money and can be considered a zero-carbon source of energy

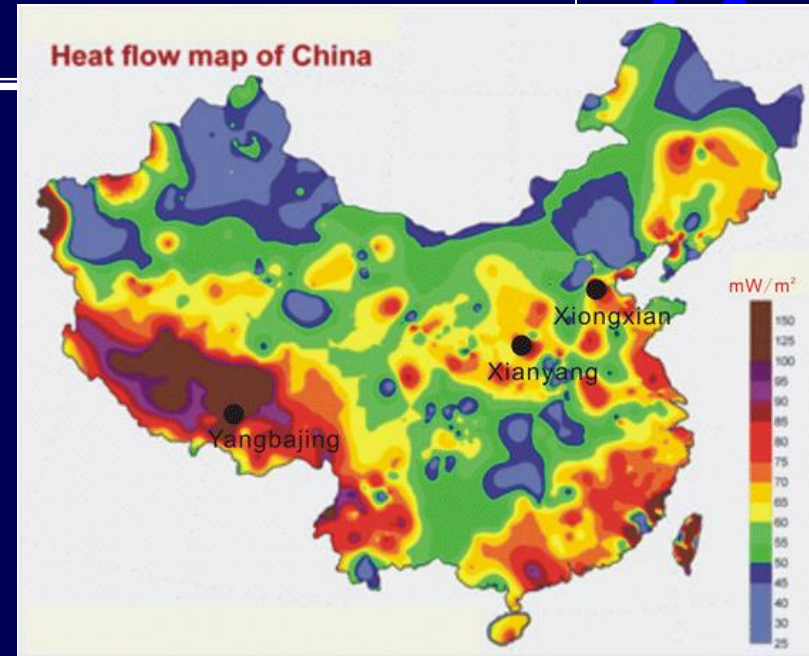


HOW DOES DISTRICT HEATING WORK

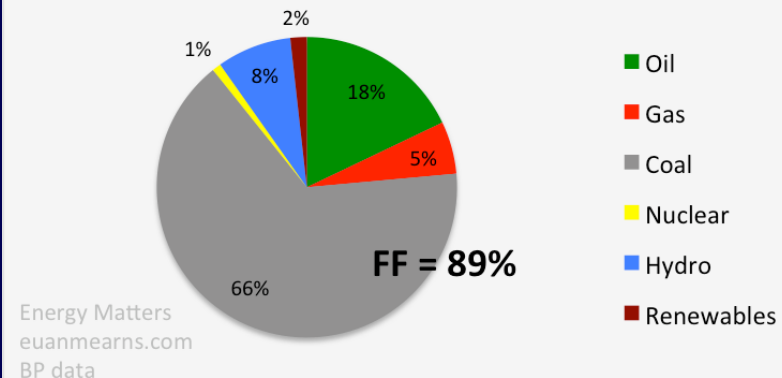


GROWTH POTENTIAL IN CHINA

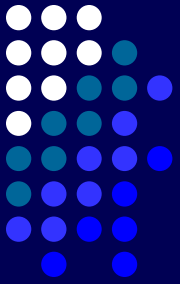
- China has an abundance of geothermal, mostly mid-low temperature (<150 °C), ideal for district heating
- China has about 8% of the global geothermal resources, equal to 853 billion tce at the depth <3km. Additionally, the geothermal resource from 3-10km is estimated at 860 trillion tce.
- More than 89% of China's primary energy comes from fossil fuels. By 2020, the target of fossil fuel use is to be reduced to 62%.
- **Geothermal is an important part of the solution**



China energy consumption 2014

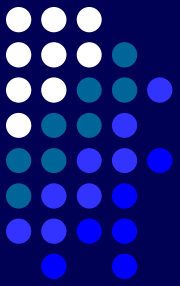


IMPORTANCE OF GEOTHERMAL ENERGY



- Clean- 0 emission
- Rich endowment
- Wide use
- Stable
- Easy maintenance
- No fluctuation:
season, climate,
day/night
- 24-7
- Safe



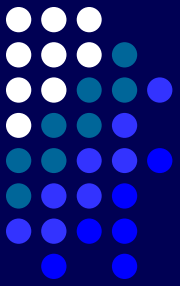


Geothermal for Heating & Cooling



www.nipic.com

By: qyyehen No: 20160727191635437000

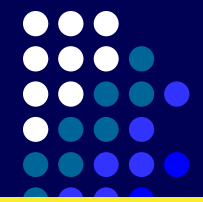


THANK YOU !!

For further information

llu@adb.org

HOW DOES DISTRICT HEATING WORK



Ground Source Heat Pump Heating Mode

Ground Source Heat Pump Cooling Mode

