

Environmental Thermal Engineering

Lecture Note #1

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Introduction Introduction



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Introduction Thermodynamics

- The study of the properties of a system according to a change in state
- The study dealing with the conversion and utilization of energy
- Establish all relationships between energy, work and heat



Introduction Covering Topics



Introduction Sun



Introduction Earth



Introduction Solar System



Reference : Radeon Graphics

Introduction Environmental Doomsday Clock



Regional Times



Represents regions/countries where the time is closer to midnaight than last year.
Represents regions/countries where the time receded back from midnight than last year.

Introduction Global Warming? Climate Change?



Introduction Earth's Temperature Change



Introduction Change in CO₂ Concentration



Introduction CO₂ Measurement



FIGURE Investigation of CO₂ concentration in the Antarctic

Introduction Abnormal Low Temperature Phenomenon



Introduction Global Climate Anomalies

Selected Significant Climate Anomalies and Events in 2020



Please Note: Material provided in this map was compiled from NOAA's NCEI State of the Climate Reports and the WMO Provisional Status of the Climate in 2020. For more information please visit: http://www.ncdc.noaa.gov/sotc

Introduction Greenhouse Effect



Introduction Rebuttal of Global Warming due to GHG



Introduction Average Temperature Change by Month

Since 1945 CO₂ level has steadily increased, yet for >70% of that time temperature has been either stable or decreasing



Source temperature: HadCRUT4 (2017) The Hadley Climate Research Unit (HadCRUT4) annual global mean surface temperature dataset

Source CO2: Boden TA, Marland G, Andres RJ (2016) Global CO2 emissions from Fossil-Fuel Burning Cement Manufacture and Gas Flaring 1751 - 2013. CDIAC, Oak Ridge National Laboratory, U.S. Dept of Energy, Oak Ridge, TN, USA,

Introduction Observed Warming in Central England



Introduction Temperature Fluctuation in the Past



Introduction Temperature for the Past 4 Billion Years



Scotese 2002

Use of Environmental Thermal Engineering



Use of Environmental Thermal Engineering Food Storage







Use of Environmental Thermal Engineering Transportation









Use of Environmental Thermal Engineering Living Convenience





Use of Environmental Thermal Engineering Leisure



Use of Environmental Thermal Engineering Medicines





Use of Environmental Thermal Engineering Air Conditioning System









Use of Environmental Thermal Engineering Cooling System













Depletion of Fossil Fuel

History of World's Proven Oil Reserves





https://www.worldometers.info/oil/

Energy Solar Energy



Wind Energy





Environmental Thermal Engineering

7.0 ~ 7.5 m/sec

7.5 ~ 8.0 m/sec

8.0 - 8.5 m/sec

8.5 ~ 9.0 m/sec

9.0 ~ 9.5 m/sec

9.5 m/sec -

Energy Hydrogen Energy – Fuel Cell



Energy Geothermal Energy





수직형 시스템 중·소형 건물에 적합한 시스템



연못형 시스템 시공이 용이하며, 가장 경제적인 시스템



수평형 시스템 수직형에 비해 경제적이며, 많은 부지가 필요한 시스템



개방형 시스템 효율이 우수하며, 대형건물에 적합한 시스템

Energy Bio-energy









Concerns about Another Oil Price War



Energy What is Shale Gas



Energy Shale Gas and Shale Oil Reserves



Q&A Question and Answer Session

