

# Transmission Lines

ENEL 487

# Towers

# Wood Pole, H-Frame

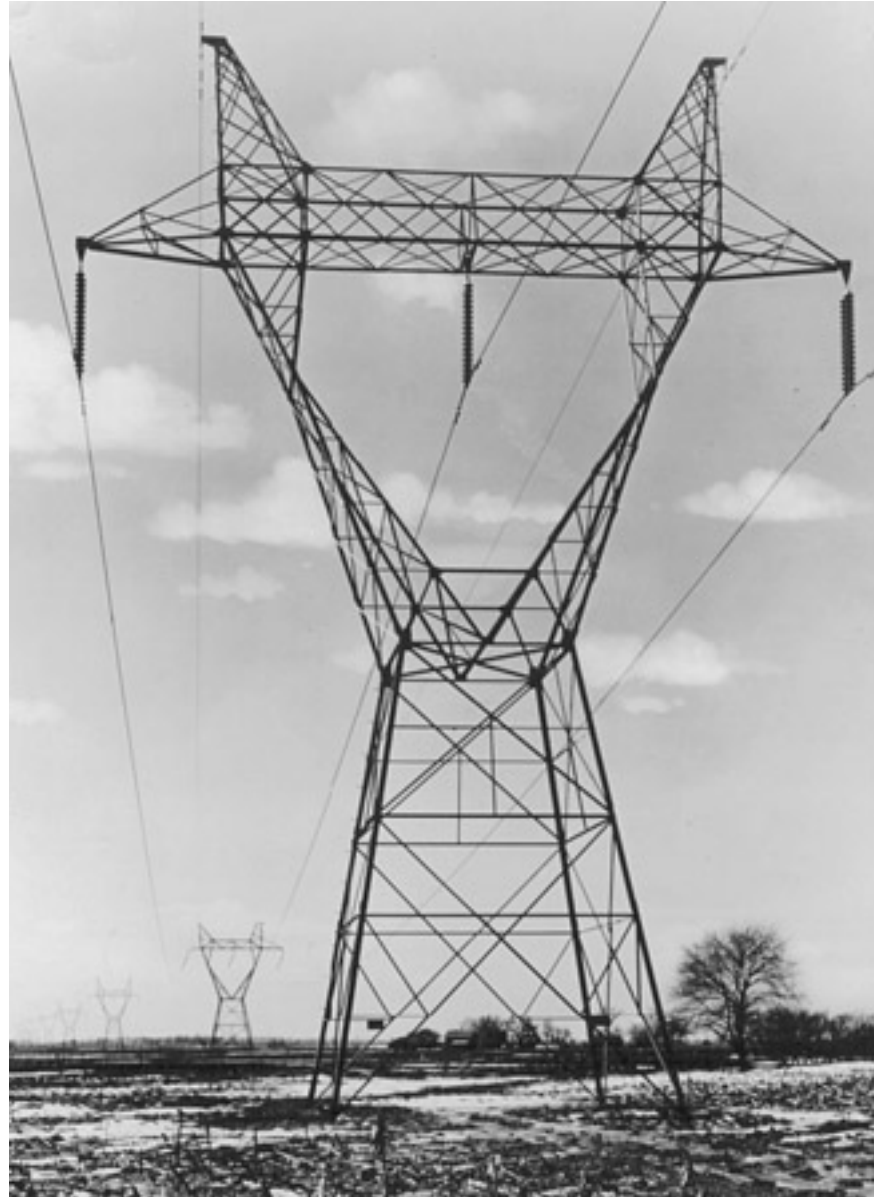




# Metal Pole

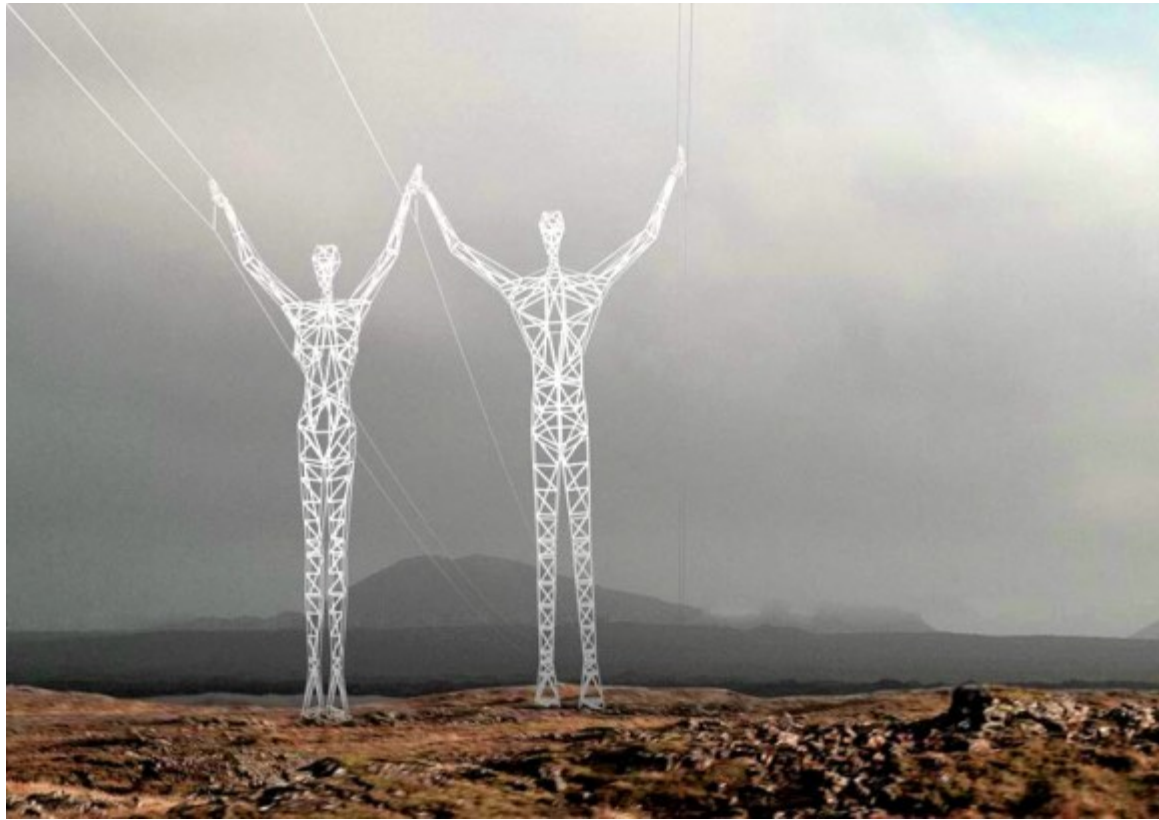


# Lattice Tower



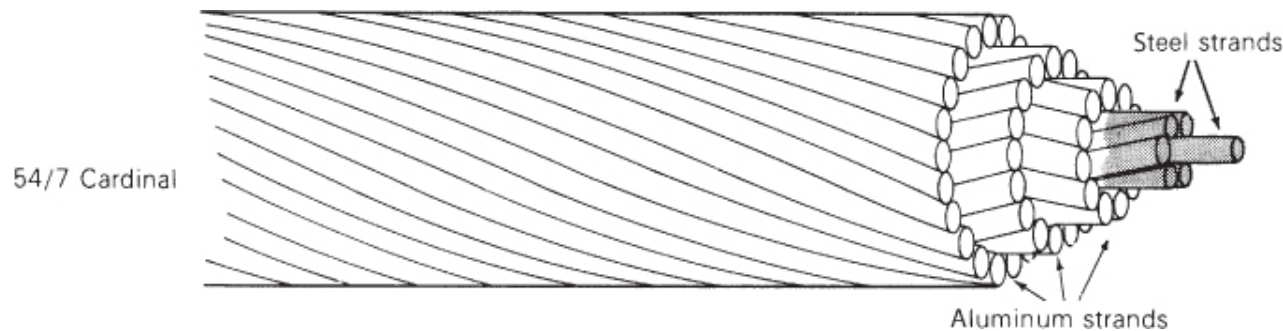


# These things!



# Conductor

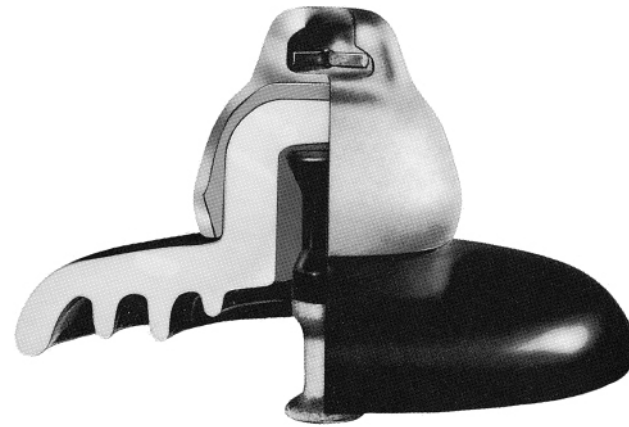
- Aluminum Conductor Steel-reinforced (ACSR)



- Strands – Ease of manufacturing & handling



# Insulation



# Insulation



# Support Structure

- Height vs. width
- Wood vs. steel

# Support Structure



# Electrical Factors

- Phase to phase clearance
- Phase to tower clearance
- Phase to ground clearance
- Lightning – Can insulators withstand?
- $I^2R$  losses , shunt admittance, shunt capacitance
- And many more!





# Mechanical Factors



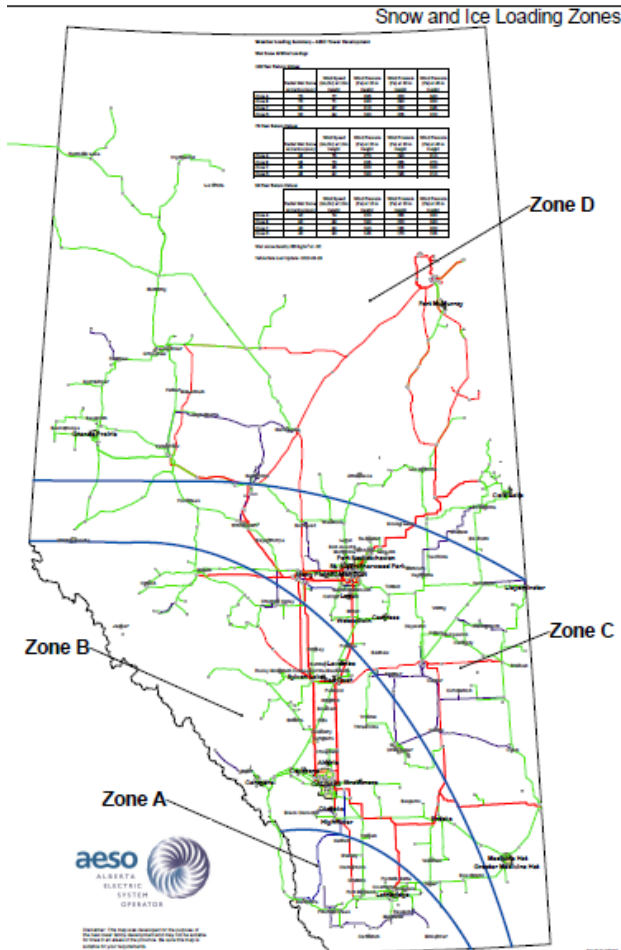
# Mechanical Factors



# Mechanical Factors



# Mechanical Factors



# Environmental Factors

- Land usage
- Visual impact
- Wild life
- Biological effects of exposure to EMF

# Economic Factors

- Cost to install
- Cost to maintain
- Line losses over their life span





# Symmetric Line Spacing



# Symmetric Line Spacing

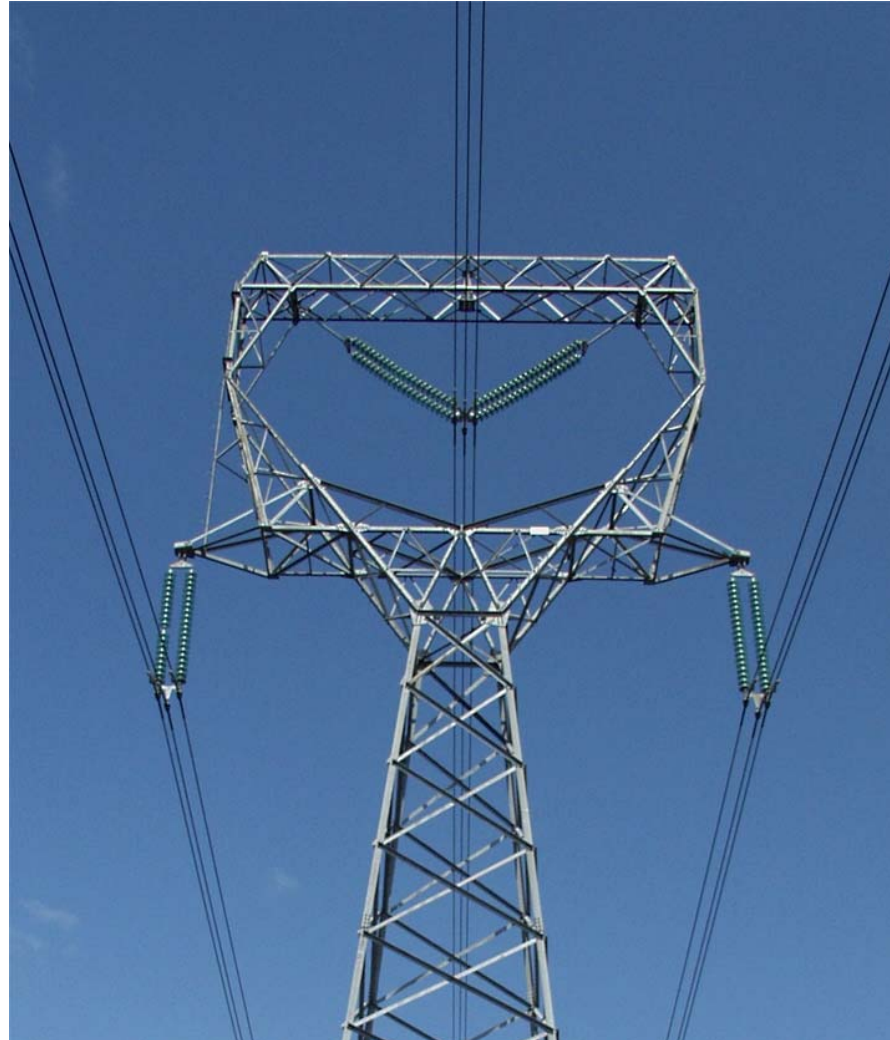




# Transposition



# Bundled Conductors



# Bundled Conductors



6 conductors per phase!



<http://i.imgur.com/6H7a4Mp.mp4>