

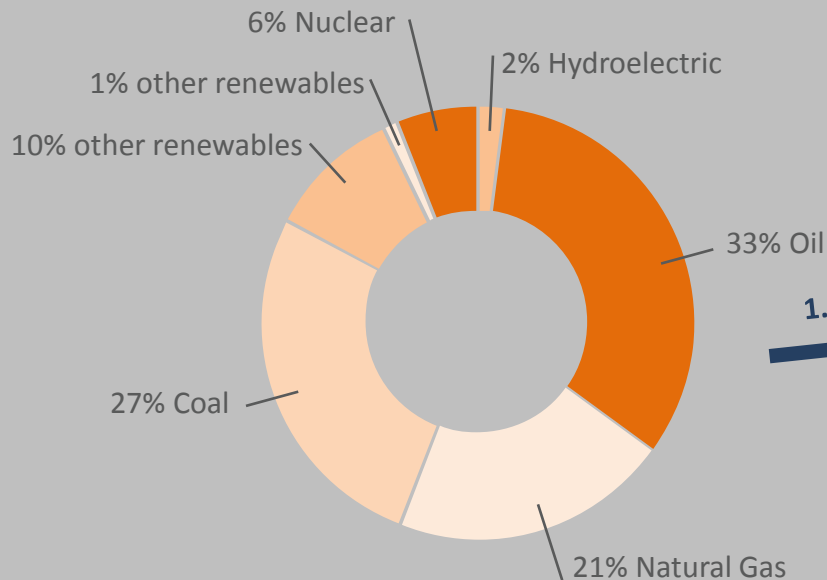
# ENERGY RESOURCES AND COST OF FUSION



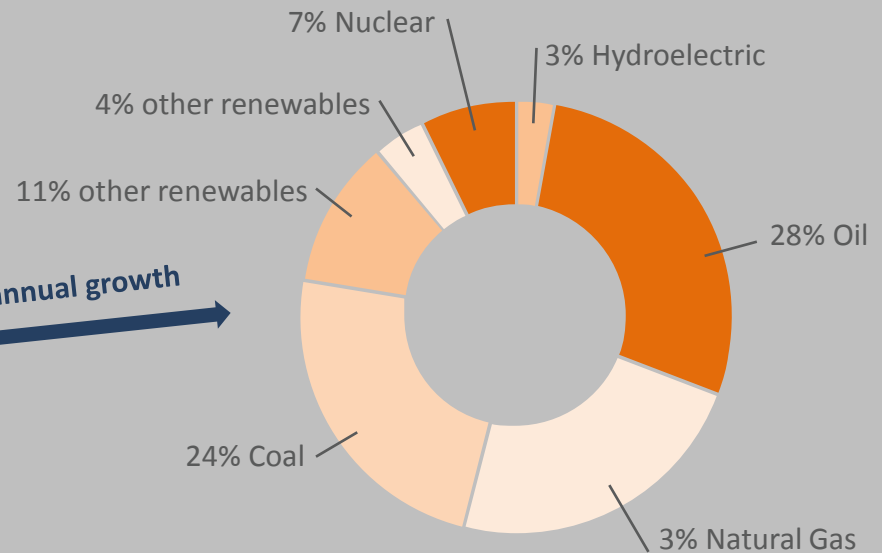
# WORLD ENERGY MIX

Growth prospects for world primary energy demand

2009 12.13 billion toe



2035 16.96 billion toe

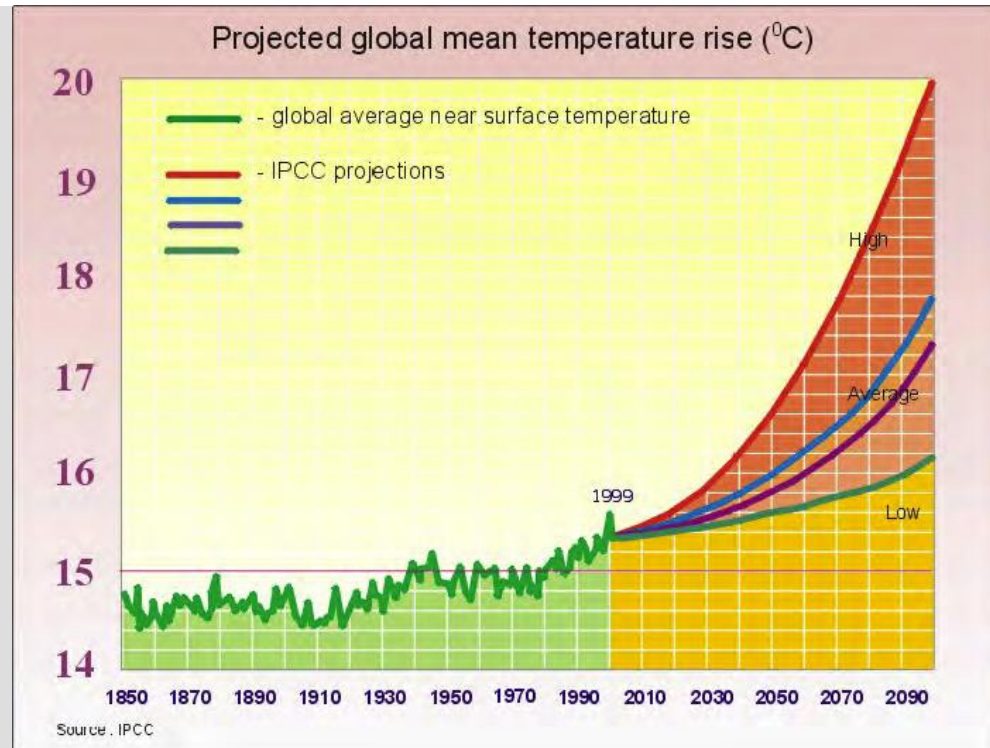


1.3% annual growth

What after 2035? Do we need an energy of the future? Yes. Fusion.

# CLIMATE CHANGE TEMPERATURES

We need a clean  
energy. Fusion is  
carbon free solution.

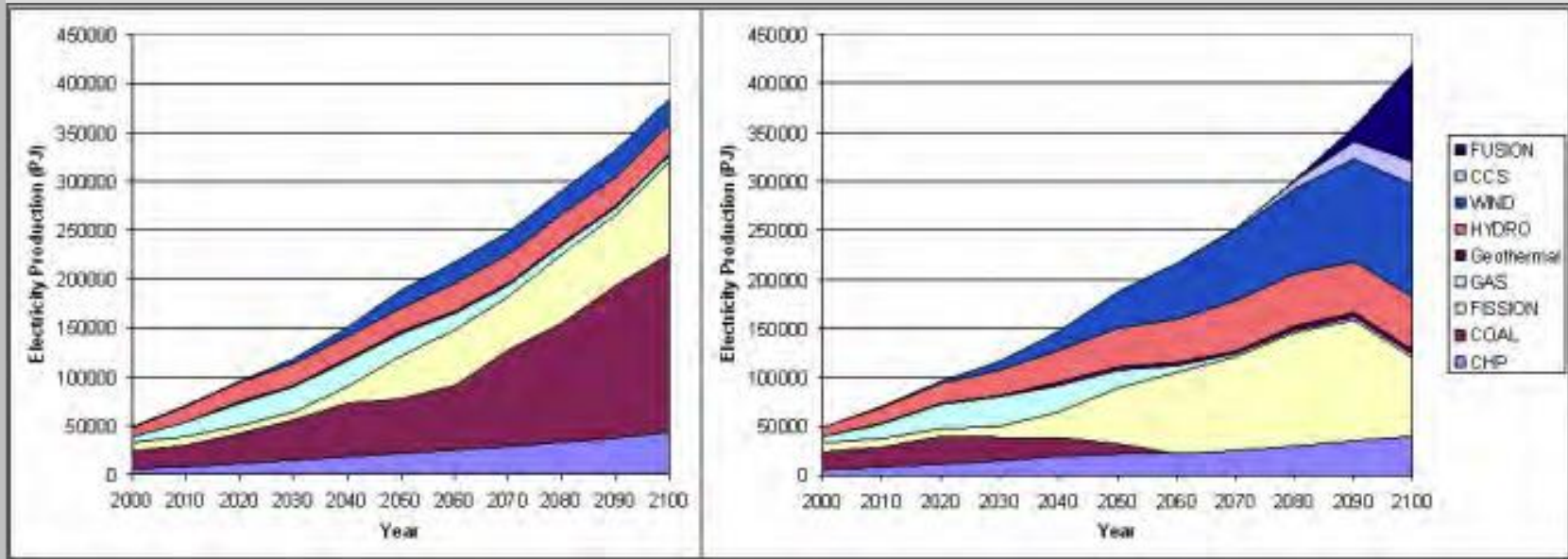


## ENERGY RESOURCES

- Unlimited energy resources for fusion
- Fusion will be an optimal alternative to the existing energy sources

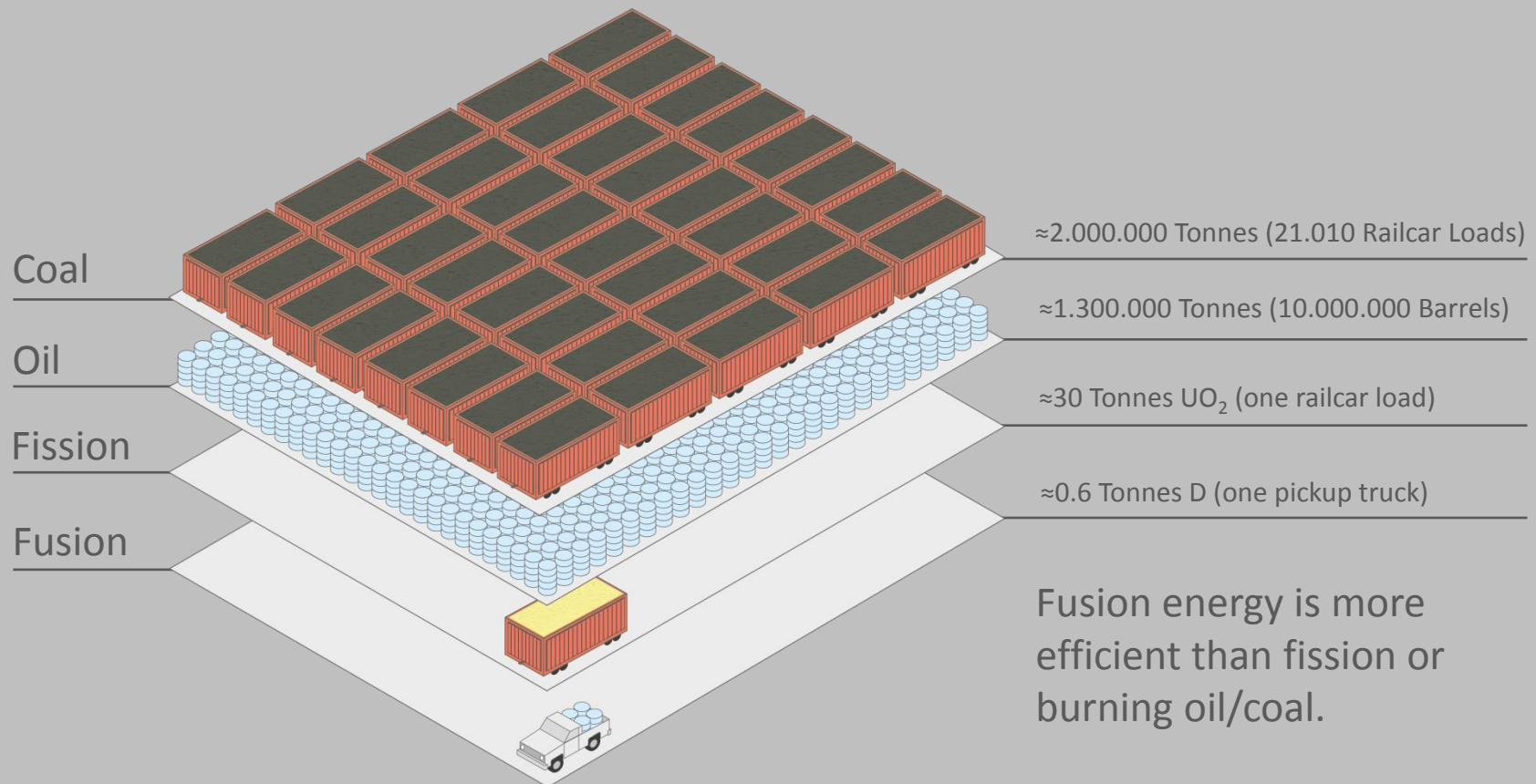


# FUSION AS A PART OF ENERGY SCENARIOS



Energy scenarios until 2100 derived from the EFDA TIMES model

# HOW MUCH FUEL WILL WE NEED FOR ONE YEAR OF OPERATION OF 1000 MW POWER PLANT



## WHY IS WORTH TO INVEST IN FUSION?

- **New energy** without greenhouse gases
- Many **advantages**:  
Sustainable source of energy
- Unlimited fuels
- Base load capacity operation

## ECONOMICS OF FUSION POWER

- Economic comparison should be made with energy sources with comparable acceptability
- Licensing requirements and regulatory constraints should be strongly reduced compared to fission plants
- The construction time should be minimized
  - No more than 5 years
- Standardization should be pursued as much as possible



## COST OF FUSION

- Power plant conceptual studies (PPCS) in Europe
- Cost of electricity for the five PPCS models

### Internal Costs

- Construction
- Fuelling
- Operations
- Disposal

### External costs

- Health effects
- Socio-economic impact

PPCS model	A	AB	B	C	D
Unit size (Gwe)	1.55	1.50	1.33	1.45	1.53
<b>Internal Cost</b> EUR cents/kWh	5-9	5-9	4-8	4-7	3-5
<b>External Cost</b> EUR cents/kWh	0.09	0.08	0.07	0.06	0.06

# FUSION SPIN-OFFS: SUPERCONDUCTORS

Powering advances in the  
superconducting industry



# FUSION SPIN-OFFS: CELLULAR NEURAL NETWORKS (CNNs) FOR DATA PROCESSING

Driving improvements in hardware systems used for real-time image processing.



# FUSION SPIN-OFFS: REMOTE HANDLING

Fine-tuning remote handling techniques

