

POWER GENERATION  
STEAM TURBINE

HYDROGEN GENERATION  
THERMAL DISSOCIATION

Dr. Mario J. Mueller



# Emerald Horizon

## THE FUTURE OF CARBON-FREE ENERGY SUPPLY

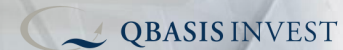
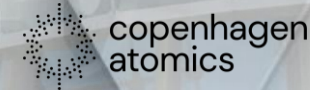


HEAT EXCHANGER  
2ND LEVEL

HEAT EXCHANGER  
1ST LEVEL

ENERGY INJECTION  
CONTROL UNIT

20' CONTAINER  
UNDERGROUND



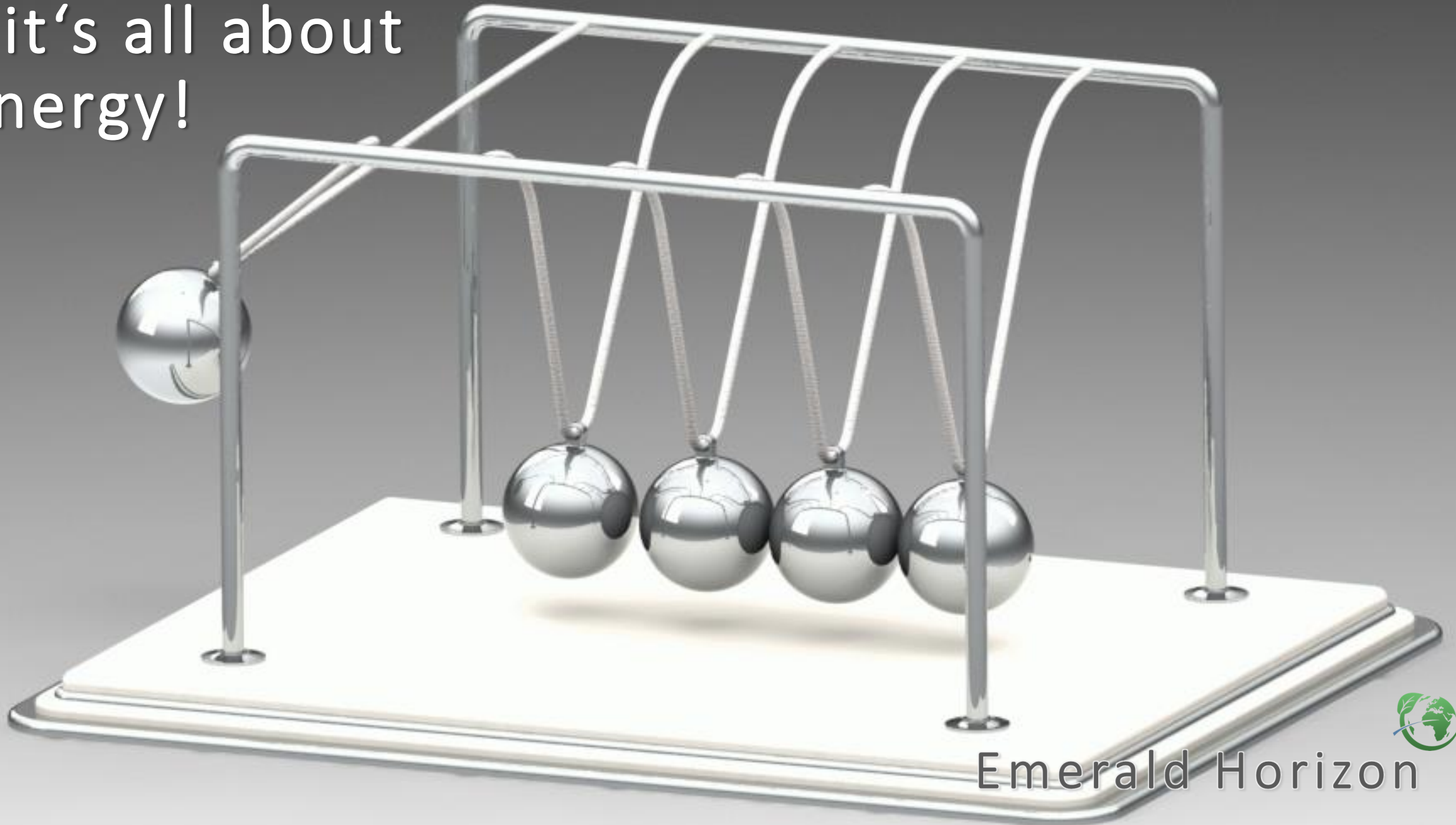


...it's all about LIFE!

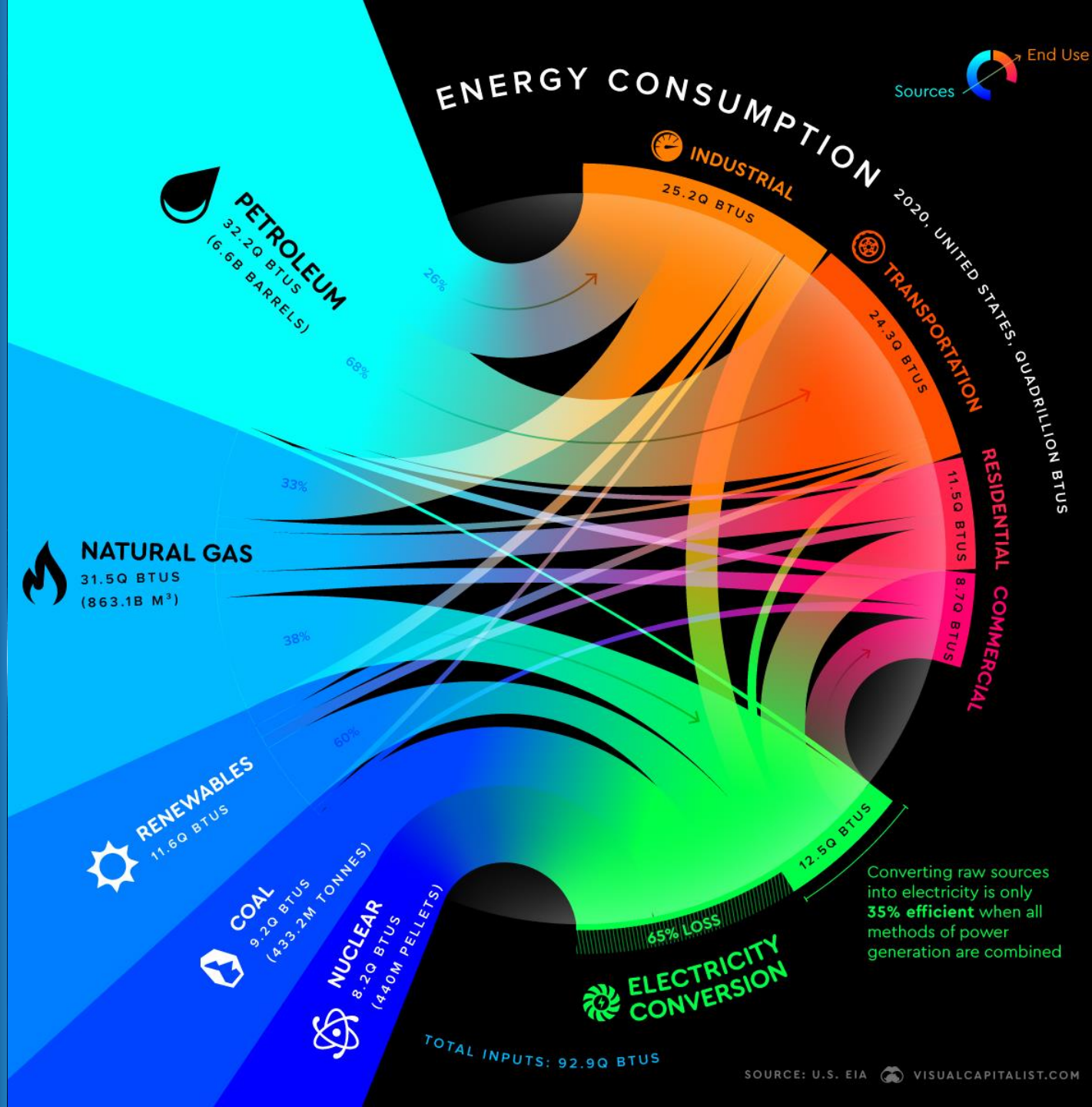
INTRO



...it's all about energy!



INTRO



# The global ENERGY SYSTEM


- o fossile driven
- o low efficiency
- o low mass density
- o centerlized supply
- o needs transformation



# THORIUM - Transformation: high energy density - with no emission!




13.000 [Wh/kg]

 130 hours  
(~5 days)



10.000.000.000 [Wh/kg]

 100.000.000 hours  
(~11.000 years)

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# ADeS objectives for the thorium energy source:

- NO direct CO<sub>2</sub>-emission
- NO environmental impact
- NO energy volatility
- NO nuclear waste problem
- NO specific environmental request
- NO large dimension needs

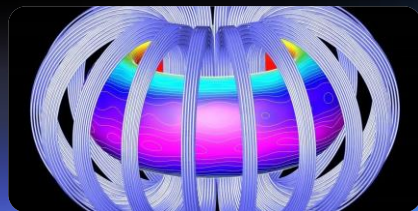
ADeS\*

\* Accelerator Driven Energy Source

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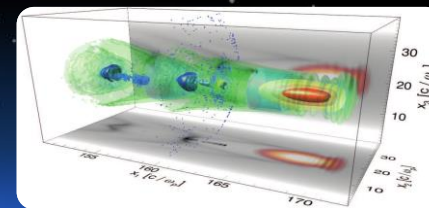
# Lessons learned: Best of the Past!



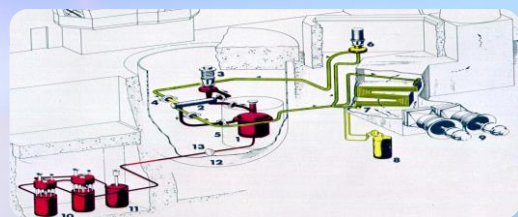
**FUSION**  
ITER 50s+



**THTR-300**  
Germany 1983-89



**WAKEFIELD**  
CHIRP 2010+



**MOLTEN SALT REACTOR**  
OAKRIDGE 60s



**THORIUM**  
USAF 50s



**ACCELERATOR**  
CERN 50s+



**AMPLIFIER**  
Carlo RUBBIA 80+90s

# ADeS

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# THORIUM - energy source module

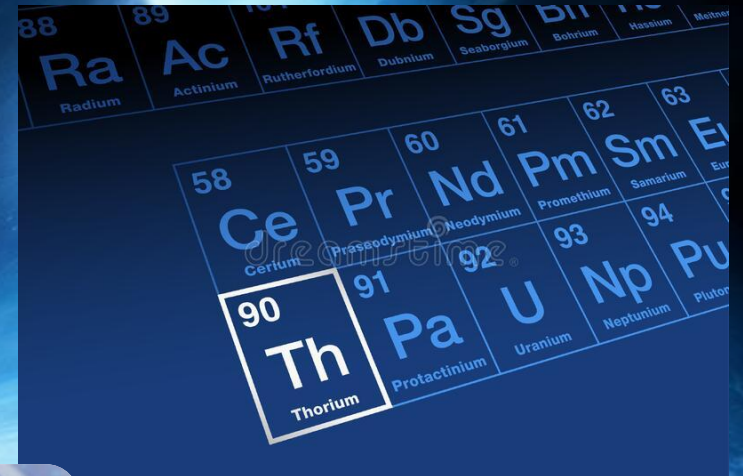




# COSMIC energy - stored for us!

FIRST IMAGES FROM  
THE EUCLID SPACE TELESCOPE

esa



88 Ra Radium	89 Ac Actinium	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium
58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium		
90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium			



Thorium, uranium, and all the other heavy elements were formed in the final moments of a supernova explosion billions of years ago.

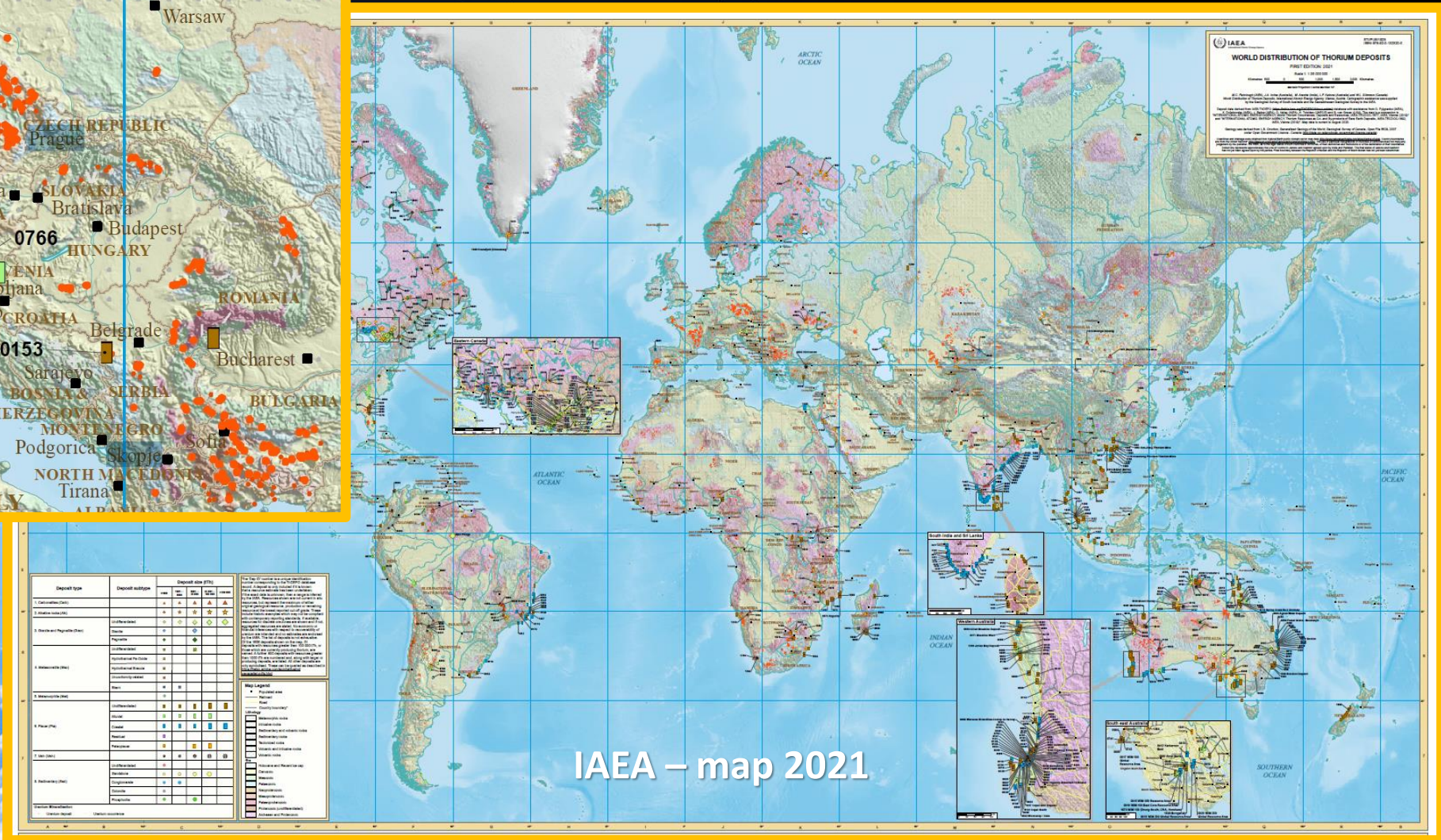
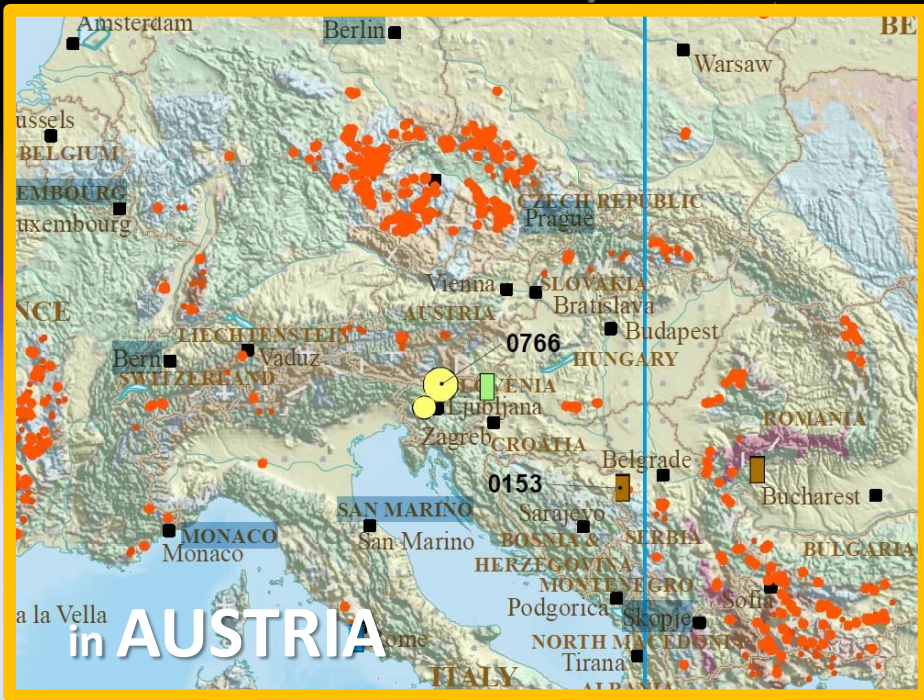
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# THORIUM – where? – how much?

THORIUM – the material





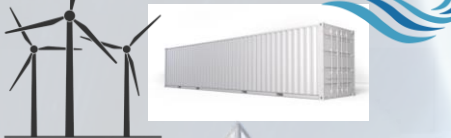
# ADĒS – Multiple USE CASES



## ADĒS protects life

ADĒS modules can make a hospital self-sustaining - i.e. used without energy from other sources

ADĒS enhances wind, water and solar energy by giving them stable production as well



## The end of conventional nuclear power plants

ADĒS modules can replace conventional (Oil | Gas | Coal) and risky nuclear power plants. The infrastructure can still be used – the modules only enhance the existing plants



## ADĒS for energy-intensive industries

ADĒS can be installed directly at industrial companies that have a high demand of heat, hydrogen or electricity



ADĒS can be used for datacenters to support KI or other critical infrastructure directly

ADĒS can be used as a redundant electricity support to make the conversion to carbon free real estates possible

ADĒS modules can be integrated into the existing grid and supports its stability

## ADĒS for e-mobility



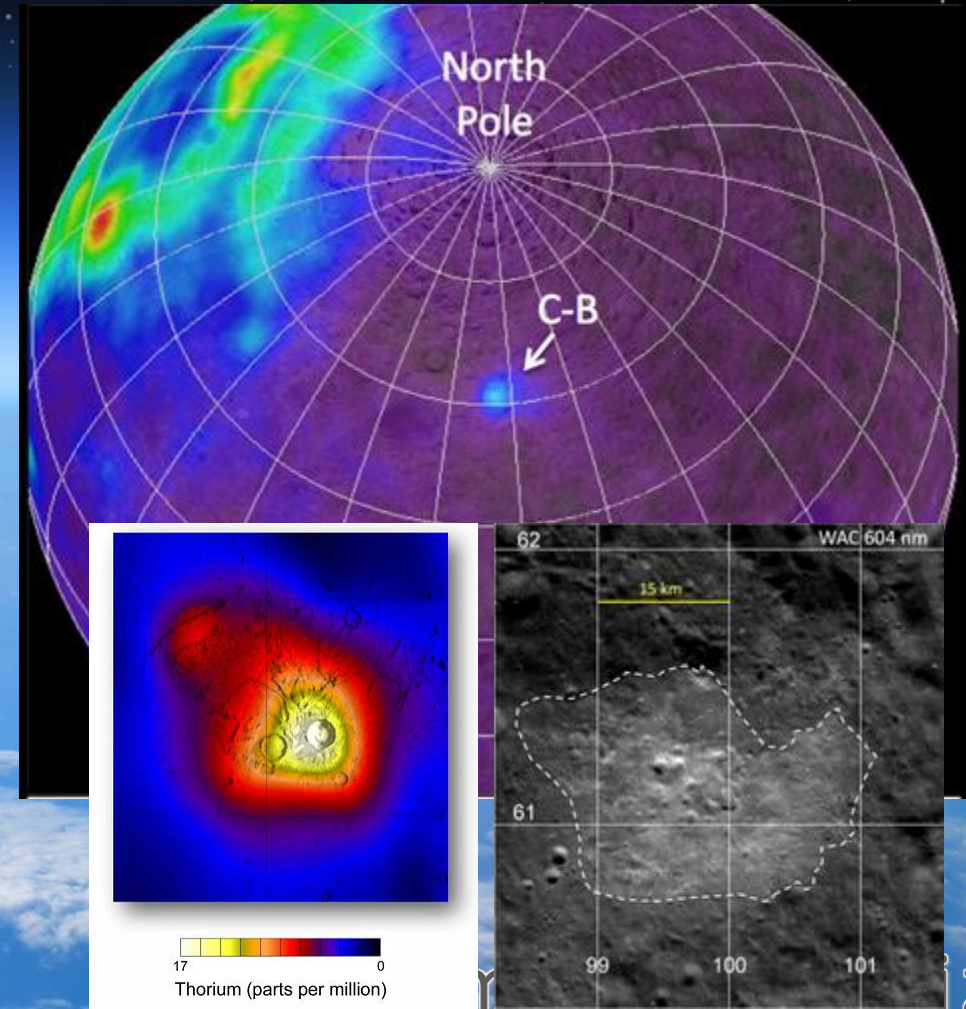
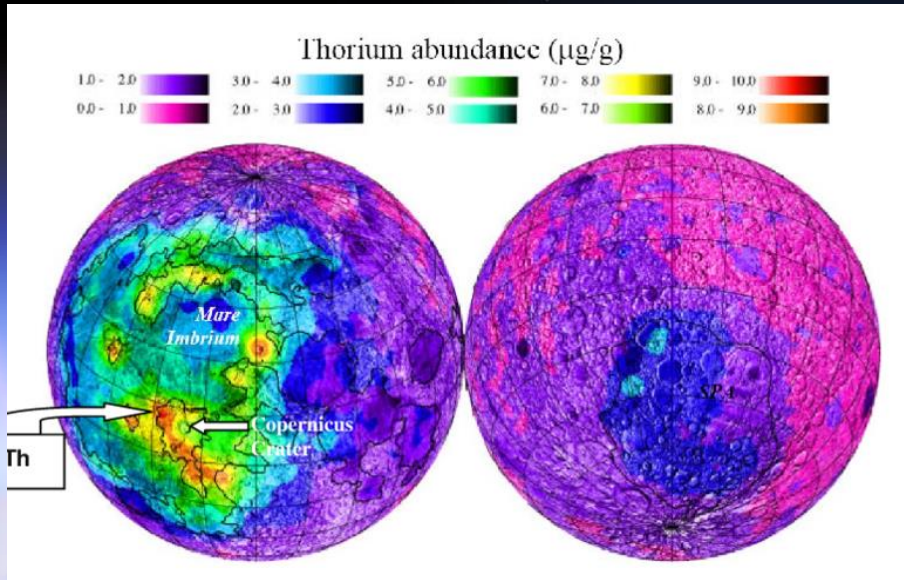
ADĒS can be installed at highway gas stations to make e-mobility charging possible everywhere

ADĒS can be brought to any place in the world at any time -emerging markets e.g. (+use case as ship propulsion)





# THORIUM – @moon for spaceport





# Transport OIL vs. THORIUM!



OIL:

Barrel = 2.800.000 pcs.

$m = 360.000.000$  [kg]

**$E = 4,4$  [TWh]**

2.800.000 x



THORIUM energy-eq:

$m = 440$  [kg]

$V = 44$  ltr  $\sim 0,3$  Barrel

0,34 x



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# OUR NETWORK FOR CREATING THE FUTURE

ADeS - network



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## IMPRINT

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