

The 4th International Conference on New Energy
and Future Energy Systems (NEFES 2019)
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Key Note:

On Some Controversies on Future Sources of the Electric Energy

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Titled Professor of Technological Sciences of Poland

I have the honor to present this
Key Note
not because of my expertise
on new sources of electric energy or future energy systems
I do not have such expertise

**I have an expertise
only
in the energy transfer in electrical systems
and improvement
of this transfer effectiveness**

I developed
the most advanced power theory
known as
**Currents' Physical Components (CPC) – based
Power Theory of Electrical Systems**

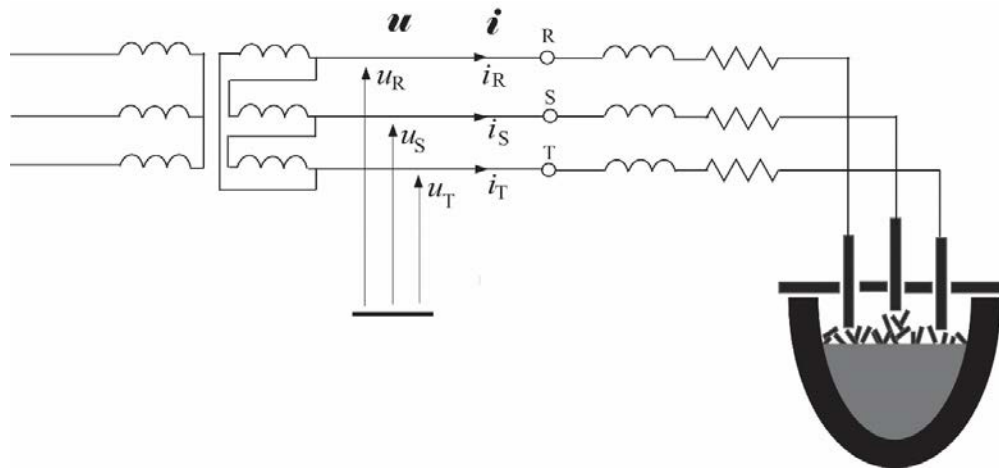
It provides theoretical fundamentals
for compensation
of the most sophisticated electrical loads

It is
the only power theory
which has such capabilities

An example of such a present-day load:

AC arc furnace

Line currents: 625 kA



$S = 750 \text{ MVA}$

Such an arc furnace has the power comparable
with one million population city

Its current is not only distorted, but also asymmetrical and random

Power factor: $\lambda \sim 0.42$

Annual bill for energy $\sim 500 \text{ Million } \$$

Being involved
in investigations on the electric energy transfer

I am only an observer
of the closely adjacent field of electrical engineering
which is the subject of this conference:

new sources of electric energy and future power systems

These observations
raise a number of questions
I would like
to share with you

After the Fukushima disaster:

According to German
nuclear experts:

All nuclear power plants in Germany
should be closed

According to United States
nuclear experts:

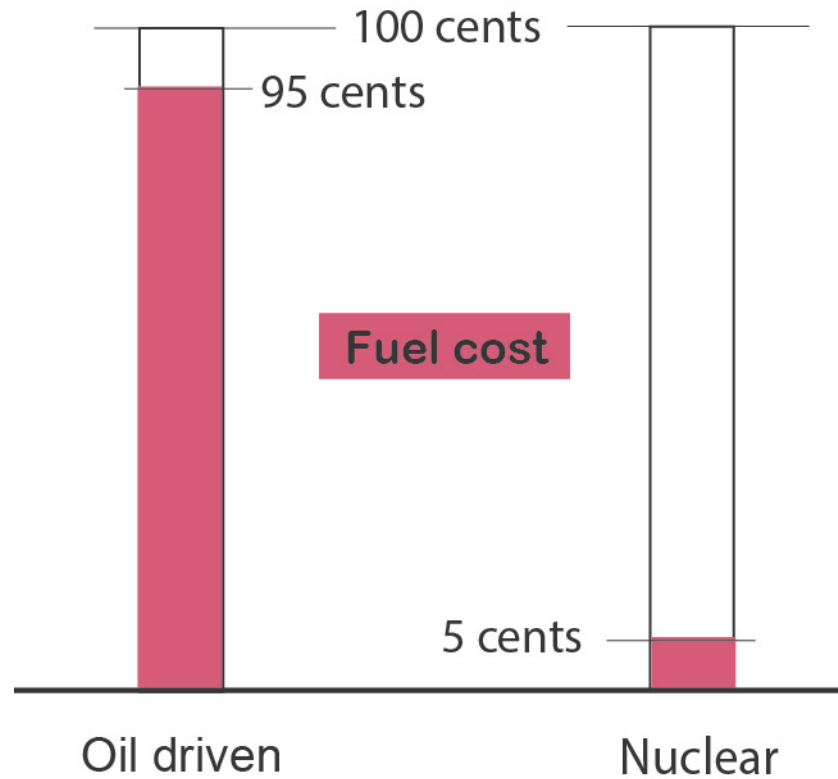
The nuclear power plants are
the safest, the cheapest
and the least affecting the environment
and US should build
31 new nuclear power plants

**Can experts be credible
if they draw
such drastically opposite conclusions
?**

Such opinions, of extremely influential experts
affect the price of the electric energy
therefore, are crucial
for

the development of new sources of electric energy

Two power plants in Baton Rouge, USA



Some agents
that affect the cost of electric energy:

- Availability in a particular place
 - Cost of harvesting
 - Controllability of production
- Impact upon the natural environment
 - Safety of harvesting
- Impact upon the food crop production
 - Earth foot print
 - Continuity of supply
- Immunity for terrorist attacks

Measures
that could enable classification of energy sources
according to these agents
of course, do not exist

In the lack of measures
that could enable classification of energy sources
as to its cost

decisions
on the selection and the development
of sources of electric energy

are highly subjective
and
affected by media

It seems
that just media
are the main factor in decision processes
on the development
of the sources of electric energy

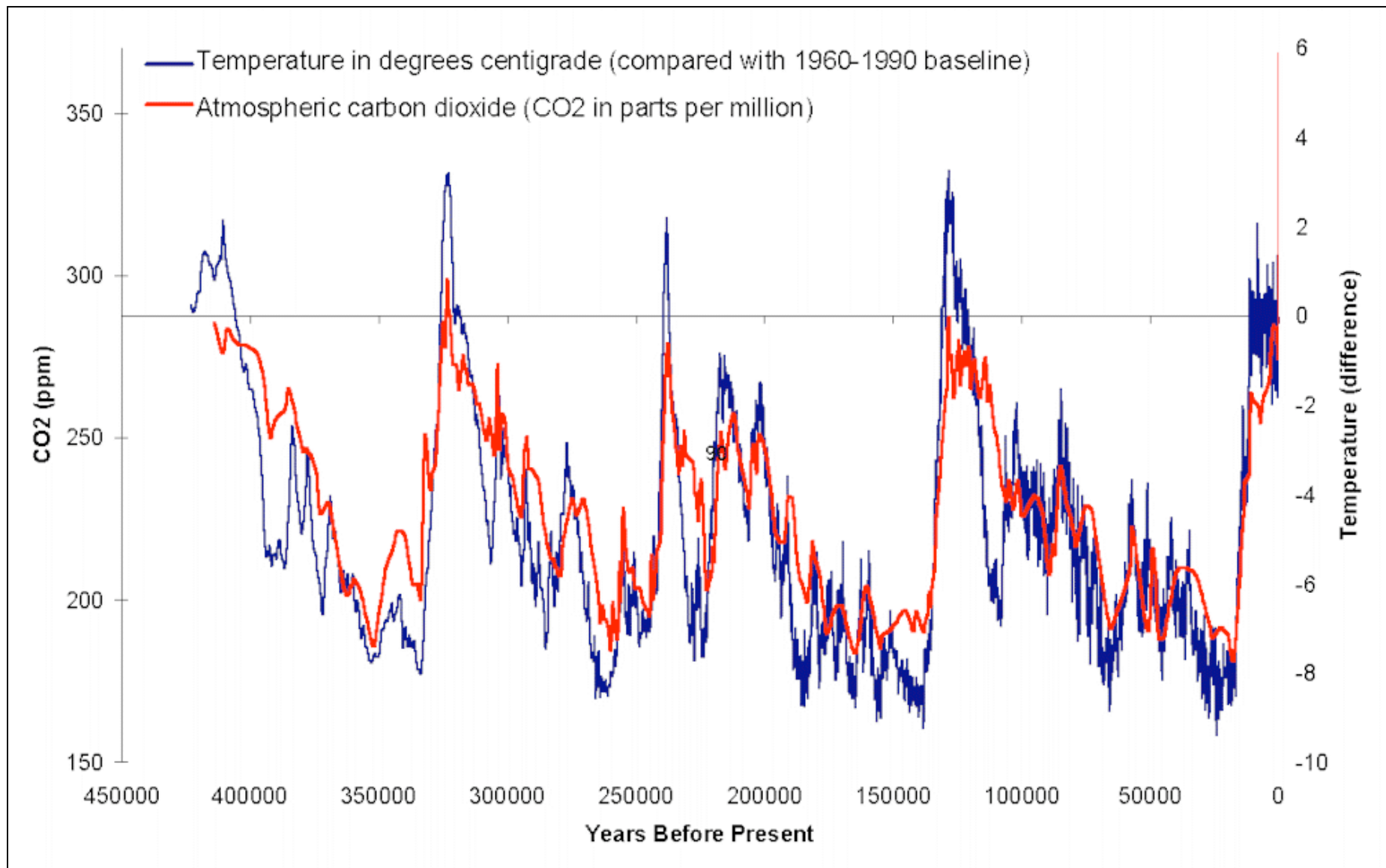
but who is hidden behind media
????

Governments?
Politicians?
Corporations?
Obsessed amateurs?
Journalists looking for an attention?

Maybe,
All of them,
but for sure, not scientists

The same applies to other issues
crucial
for the development of sources of electric energy

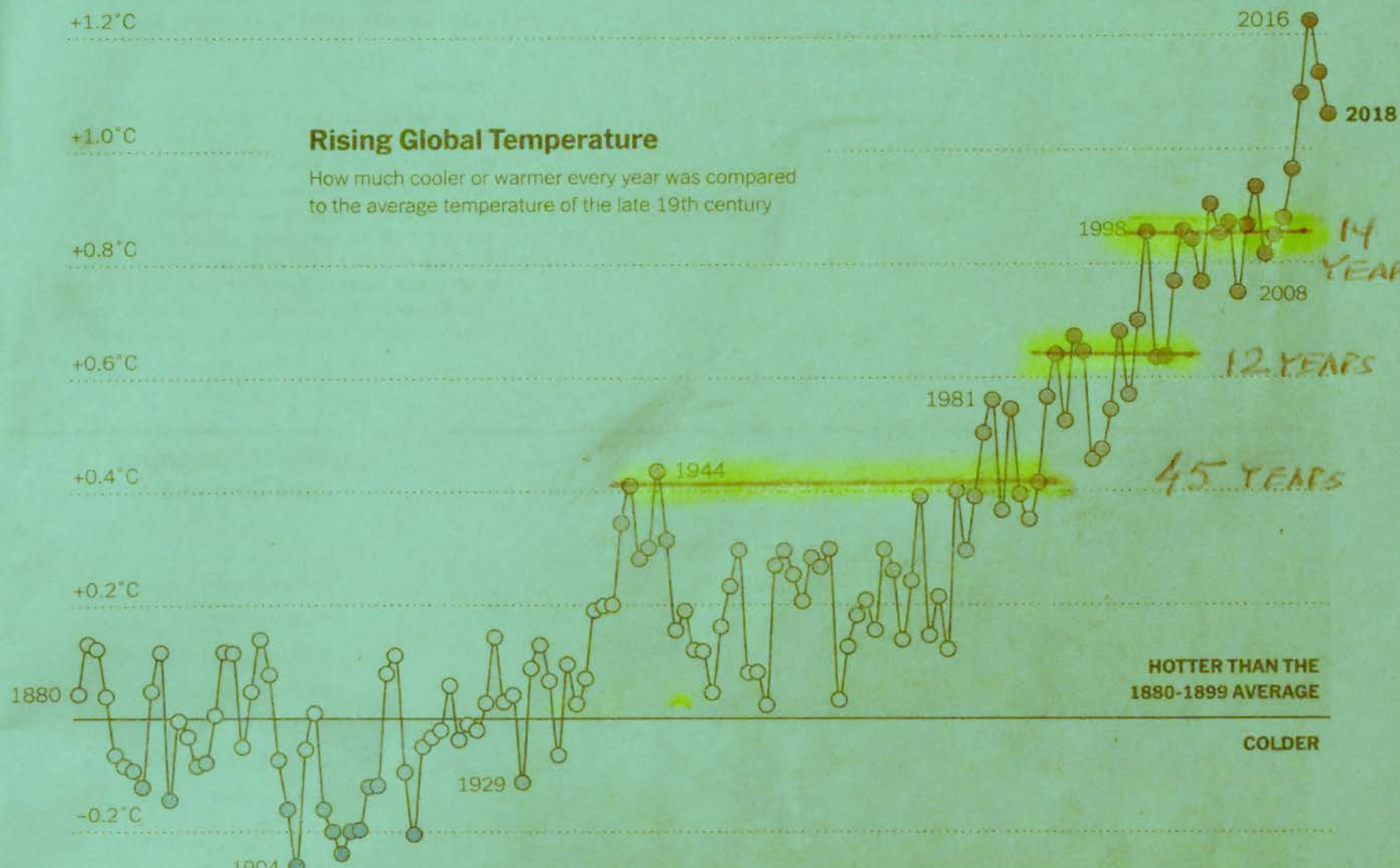
One of them
is
the public opinion that
concentration of the carbon dioxide in the Earth atmosphere
is responsible for global warming



In the majority observation intervals
temperature changes first, CO2 changes later

An example of another common view:

In the public opinion
human activity
is responsible for global warming



Global temperature changes in jumps, but human global activity increases continuously

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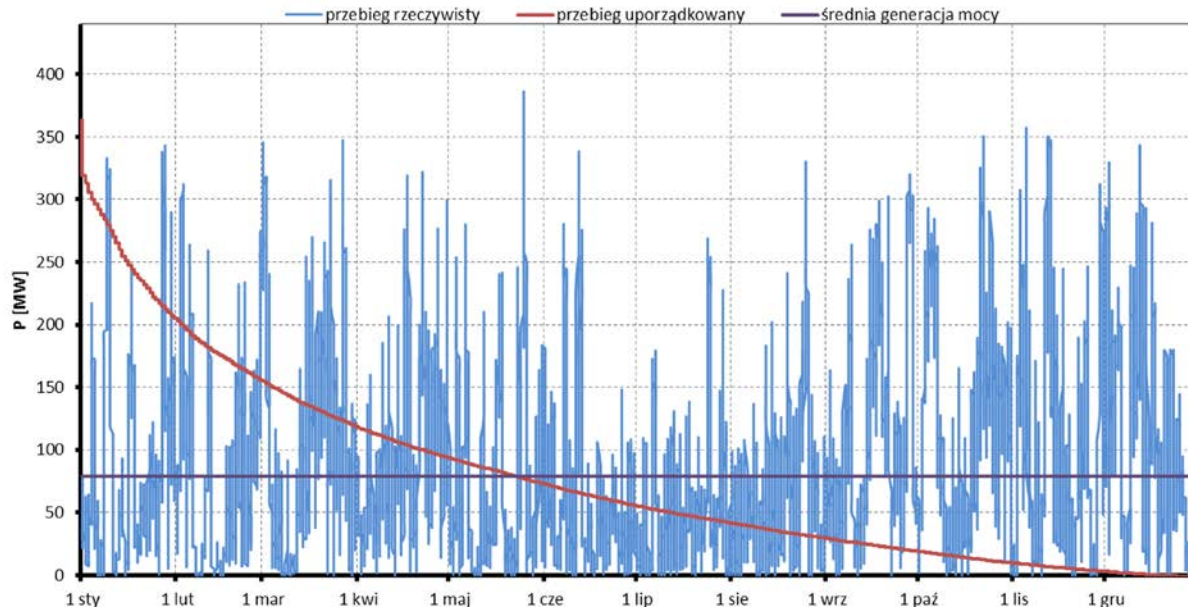
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**Public opinion:
No Nuclear – go to wind energy**

If not
a nuclear plant, let us go to a wind farm?

Baton Rouge River Band
nuclear plant
 $P = 1500$ MW

Wind farm with 500 generators x 3 MW



Installed power: $P = 455$ MW

Average available power: $P = 80$ MW

Needed:
 $500 \times 455/80 = 2840$ generators

Baton Rouge River Band
nuclear plant
 $P = 1500 \text{ MW}$

Equivalent to:

Wind farm with
2840 x 3 MW generators

Needed: (How much??)

- Steel,
- Energy,
- Water
- Space,
- Human resources

1

Earth foot print:

31

80 years

Life expectations:

20 years

Baton Rouge River Band
nuclear plant
 $P = 1500$ MW

Wind farm with
2840 x 3 MW generators

Earth foot print:

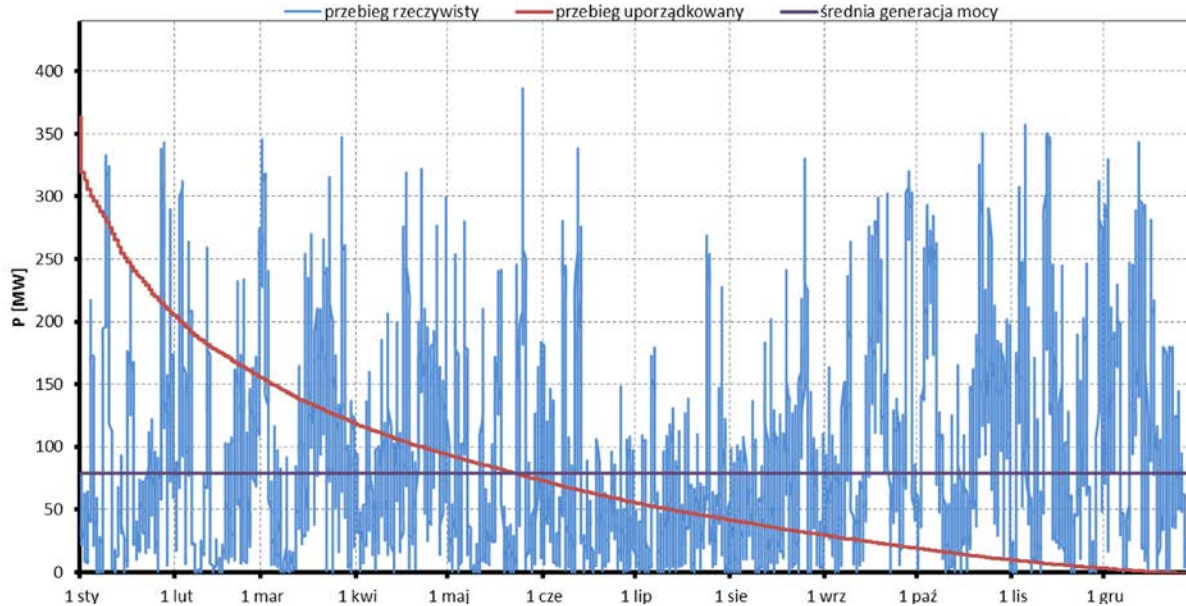
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Life expectations:

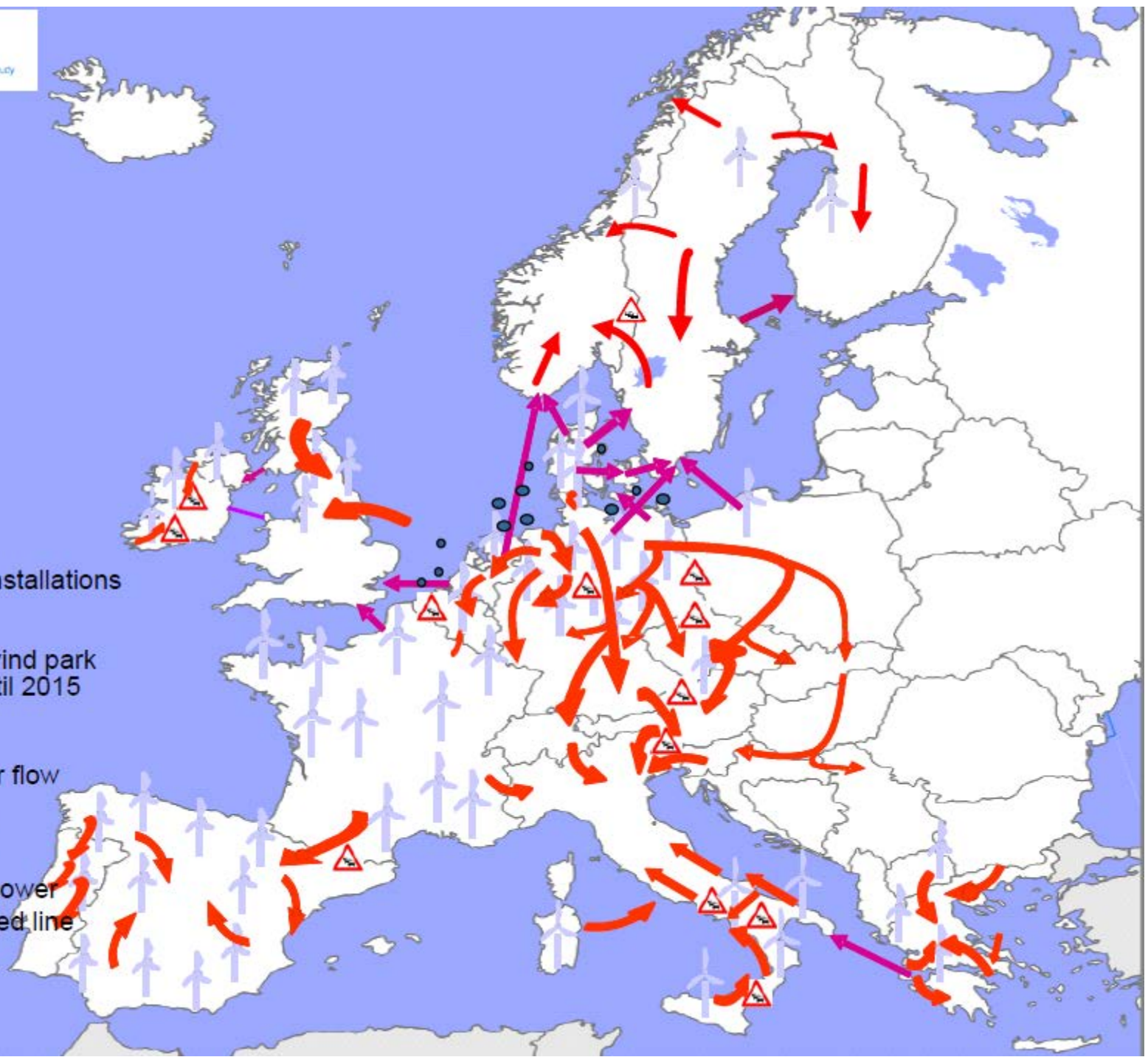
80 years

20 years



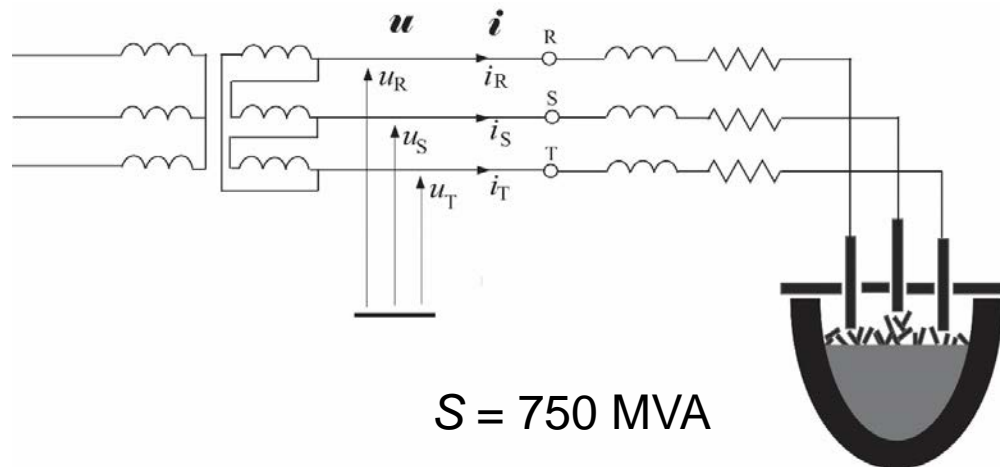
Even if we have a wind farm,
we need a reliable source of electric energy

- Onshore installations
- Offshore wind park cluster until 2015
- Bulk power flow
- Bottleneck
- Bulk DC power flow at rated line capacity

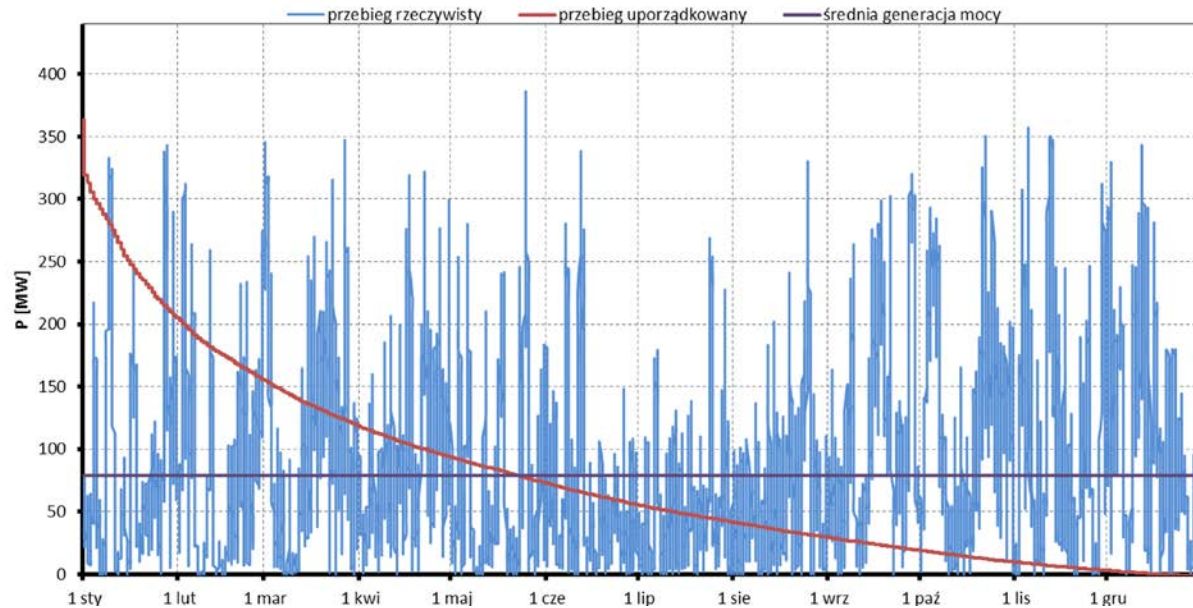


In developed countries, approximately 80%
are industrial loads, often
very sensitive for the energy supply continuity

AC arc furnace is an example of such a load
with line currents: 625 kA



Energy sources
with the power variability of wind farms
are, of course,
beyond any consideration for that



In USA, because of the public opposition
for 50 years, instead of developing nuclear plants,
the electric energy is mainly (~50%) produced
in coal driven power plants

A comment on safety of electric energy production

from the United States perspective:

Electric energy production:

Nuclear: 18%

Coal: 50%

Death accidents:

0 (Whole history)

in coal mines: ~30/year

Death number
caused by emission
of poisonous gases
and microparticles
??

In public, media-driven, opinion:

Nuclear power plants
are dangerous

Conventional power plants
are safe

A confusion,
amplified by media
as to direction of development
of major sources of electric energy
and its predicted costs

affect
the power systems development
in particular,
implementation of research results on Micro-Grids

Observation:

On IEEE Explore are reported
3300 journal papers on Micro-Grids

In United States is operated:
ONE Micro-Grid !!

Conclusions

In my opinion,
development of electrical sources of energy
is strongly affected by media

Reduction of media influence upon this development
would be very beneficial for earth economy

Unbiased, genuine research on merits
of various sources of electric energy
is needed for that

Thank you