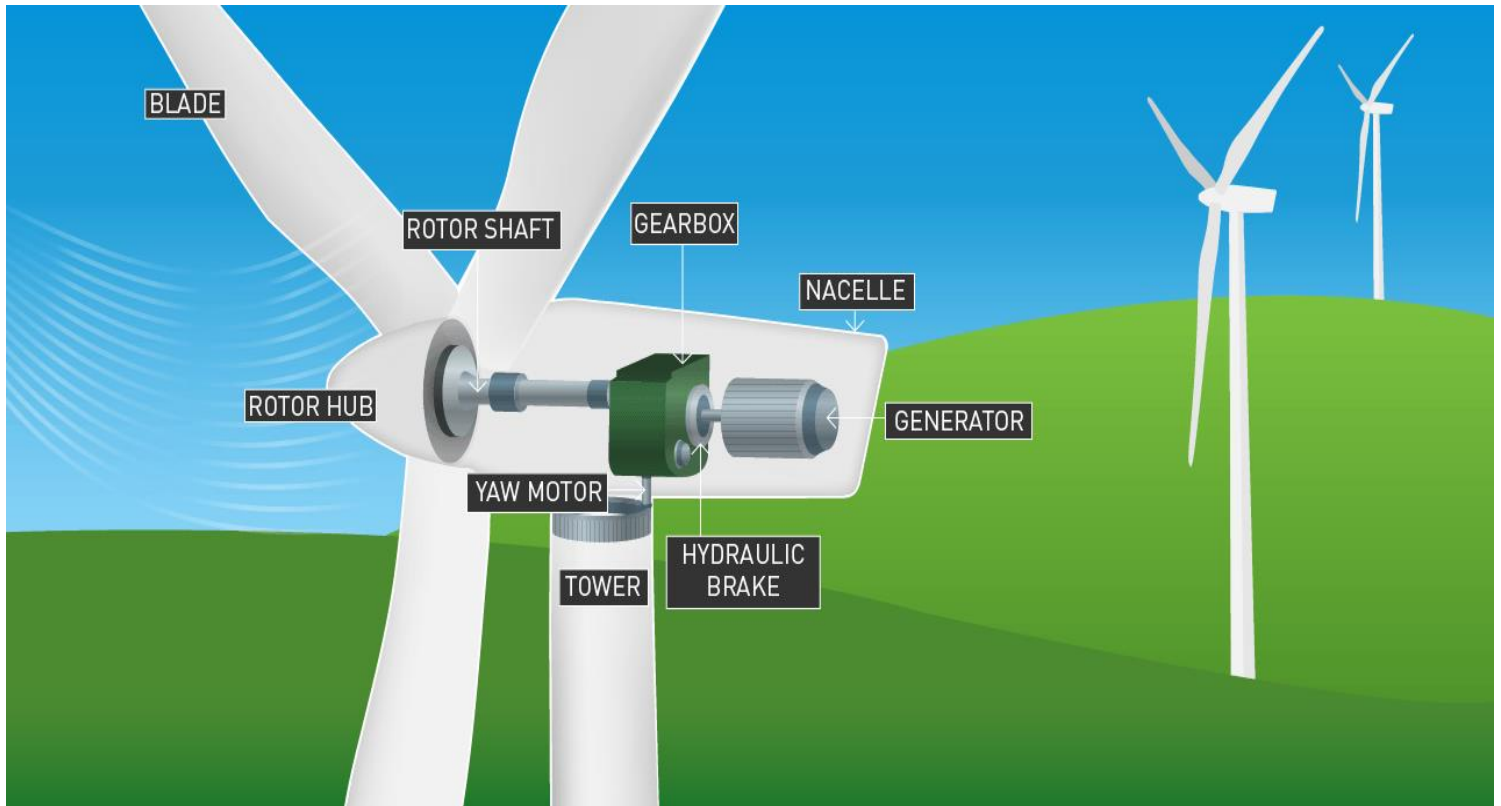


ALL ABOUT



WIND TURBINES

compiled by: Dan Pemble & Updated on July 18, 2023
MindSet TecNiques™

INTRODUCTION

As a result of a visit to northwest Iowa during July 2-5, 2023, I was astonished at the sight of hundreds of wind turbines scattered about the country side. As such, I wrote the article on the following page and was then inspired and highly motivated to learn much more.

My approach to enhancing my knowledge about wind turbines was to visit a number of web sites that provide relevant information about a number of related subjects that were of interest to me and hopefully will be of interest to you too!

In this compilation, instead of me plagiarizing words contained in an array of web sites, the following pages have simply listed the major subjects of interest and provided a related web site address. Most of the listed web sites in this compilation are “hyperlinked”; thus you simply need to click on the blue-highlighted site and it should open; if a site does not open, you will need to copy and paste its noted addresses into your web browser.

Beyond any discussions related to climate change and global warning, I think the entire subject of wind turbines, as alternate efficient sources for electricity production, is fascinating!

I hope that you will find what I have assembled here to be of interest.



Let the Iowa Winds Blow!©

By Dan Pemble, Kissimmee, Florida – July 7, 2023

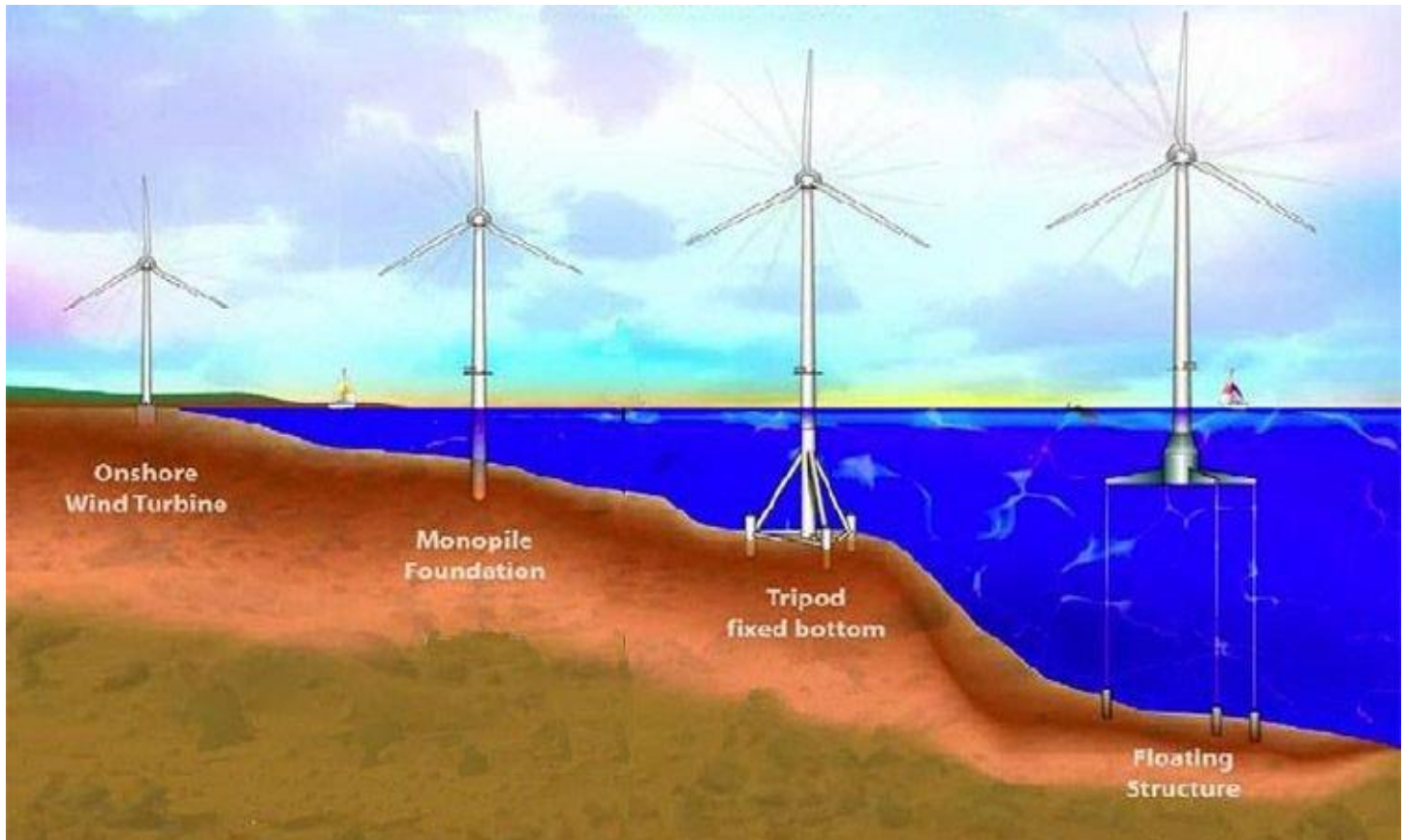
I recently enjoyed a 4-day stay in Iowa, my place of birth, to celebrate my brother's 90th birthday. Iowa is known as the "corn state" and that it is! At this time of year, Iowa's intense green country-side color is primarily attributed to endless fields of growing corn – as far as the eye can see in every direction. The mostly-flat United States Mid-west "prairie" in Iowa, has sustained-mild wind conditions that make it an ideal location for wind turbine operations. As such, 1000's of wind turbines can be seen throughout the state!



The sight of wind turbines scattered around the Iowa country side has prompted me to learn more; thus, my research has revealed the following facts about wind turbines in Iowa (as of 2022):

- Over 6220 wind turbines have been erected in Iowa (2nd highest in the USA behind TX)
- 62% of all electricity generated in the state of Iowa was from wind turbines (2ND highest behind SD)
- Wind turbine blades are manufactured in Iowa by Siemens in Ft. Madison and by TPI composites in Newton. Wind turbine towers are also manufactured in Newton by Arcosa.
- As of January/2022, there were over 70,800 USA wind turbines as erected in 44 states, plus Puerto Rico and Guam

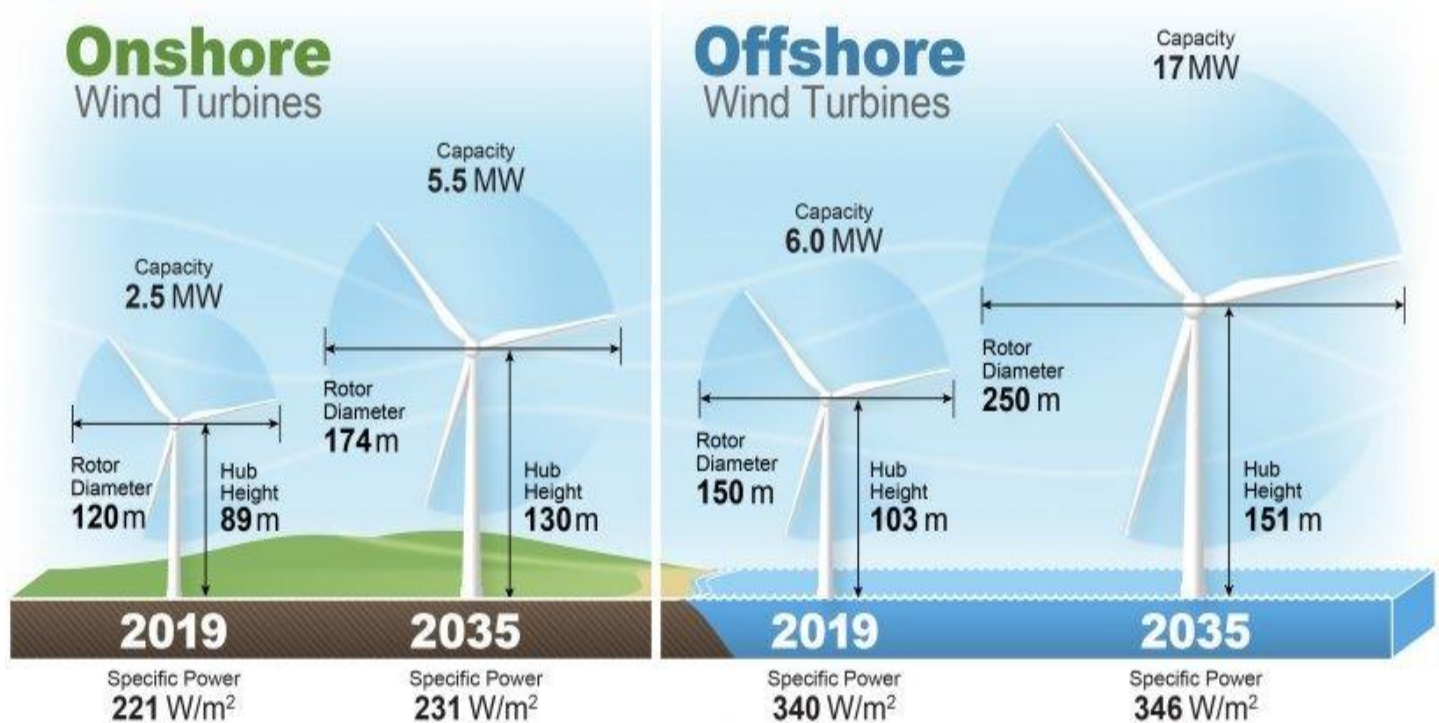
WIND TURBINES



VARIOUS INSTALLATION TYPES & SITES

THE EVOLUTION OF WIND TURBINES

AS YOU CAN SEE IN THE ILLUSTRATION BELOW, SINCE THEIR INITIAL CONCEPTION, TECHNOLOGICAL ADVANCEMENTS HAVE RESULTED IN WIND TURBINES BECOMING INCREASINGLY LARGER WITH HIGHER ELECTRICAL PRODUCTION. GOOD NEWS. ACTUALLY, LARGER/HIGHER CAPACITY TURBINES COULD REPLACE MULTIPLE LOWER CAPACITY UNITS!



WIND TURBINES



TYPICAL ON SHORE WIND FARMS

WIND TURBINES



TYPICAL OFF SHORE WIND FARMS

WIND TURBINE COSTS

<https://weatherguardwind.com/how-much-does-wind-turbine-cost-worth-it/>

<https://www.semprius.com/how-long-does-it-take-a-wind-turbine-to-pay-for-itself/>



INVESTING IN WIND ENERGY

<https://www.fool.com/investing/stock-market/market-sectors/energy/wind-energy-stocks/>

<https://www.forbes.com/advisor/investing/best-wind-power-stocks/>



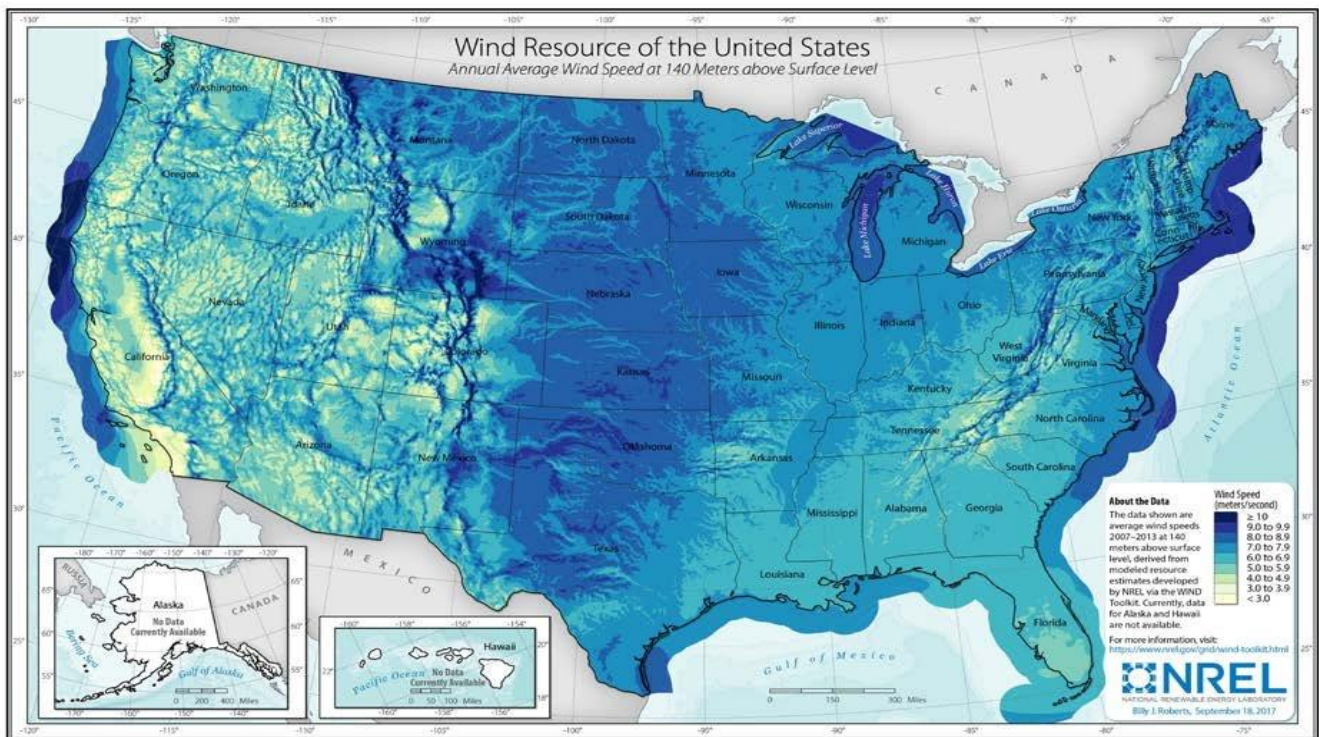
LAND OWNER LEASE AGREEMENT FOR CONSTRUCTION OF WIND TURBINES

<https://landgate.com/news/2023/03/06/earn-income-from-wind-turbines-on-your-land/>



WIND TURBINE SITE CONSIDERATIONS

WHEN SELECTING A SITE FOR CONSTRUCTION OF WIND TURBINES, AMONGST ALL OTHER CONSIDERATIONS, THE AVAILABILITY OF ADEQUATE WIND POWER IS OF PRIMARY IMPORTANCE! FOLLOWING IS A MAP SHOWING AVERAGE USA WIND SPEEDS AT A HEIGHT OF 140 METERS ABOVE GROUND LEVEL. YOU CAN ENLARGE THE VIEW FOR CLARITY. THE DARK BLUE AREAS ARE WHERE THE HIGHEST WIND SPEEDS EXIST.



ON SHORE WIND TURBINE CONSTRUCTION

<https://www.youtube.com/watch?v=0vE6QkvcV-s>

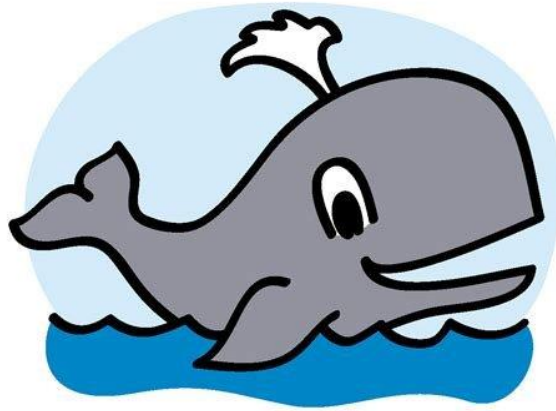
NOTE: The above link provides an excellent video presentation of just how on shore wind turbines are installed. Do have a look.



ARE OFF SHORE WIND FARM PRE-CONSTRUCTION SURVEYS KILLING WHALES?

THE FOLLOWING LINK SAYS IT IS UNLIKELY!

<https://www.cnn.com/2023/01/20/us/whale-deaths-offshore-wind-climate/index.html>



OFF SHORE WIND TURBINE CONSTRUCTION

https://duckduckgo.com/?q=offshore+wind+turbine+construction+video&ia_x=videos&ia=videos&iai=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3D3DmDvS7tizetg

[3DmDvS7tizetg](https://www.youtube.com/watch?v=3DmDvS7tizetg)

NOTE: This link offers several videos of off shore wind turbine construction. The specific type of construction for off shore wind turbines is exclusively based on the depth of the ocean at the chosen location.



WIND TURBINE COLD WEATHER OPERATIONS

THE FOLLOWING WEB SITE PROVIDES SOME EXCELLENT DISCUSSION ABOUT THE ABOVE SUBJECT:

<https://interestingengineering.com/science/wind-turbines-fail-cold-weather>



BIRD DEATHS DUE TO WIND TURBINES

FOLLOWING ARE SOME RELEVANT WEB SITES:

<https://www.smithsonianmag.com/smart-news/how-many-birds-do-wind-turbines-really-kill-180948154/>

<https://abcbirds.org/blog21/wind-turbine-mortality/>

<https://arstechnica.com/science/2020/08/black-paint-on-wind-turbines-helps-prevent-bird-massacres/>

<https://birdfact.com/articles/do-wind-turbines-kill-birds>

IT IS IMPORTANT TO NOTE THAT A SUBSTANTIAL NUMBER OF BIRD FATALITIES IS ATTRIBUTED TO COLLISIONS WITH WIND TURBINES, ALTHOUGH THIS NUMBER IS FAR BELOW THE TOTAL NUMBER OF BIRD DEATHS CAUSED BY CATS AND COLLISIONS WITH CELL TOWERS, BUILDINGS, & WINDOWS. OF COURSE ANY NUMBER OF BIRD DEATHS CAUSED BY WIND TURBINES IS UN-ACCEPTABLE AND VARIOUS MITIGATION EFFORTS ARE ALREADY UTILIZED AND OTHERS ARE BEING EXPLORED.

WIND TURBINE NOISE LEVELS

<https://www.turbinegenerator.org/wind/home-wind-turbine/noise/>



MY NOTES:

1/ This graphic is from a General Electric site. The scale on the right is graduated in 10 decibel (dB) increments; the dB is a unit used for sound level measurement

2/ The noise from a turbine at a house 300 meter (328 yards or 984 feet) away is approximately 43dB

WIND TURBINE MAINTENANCE

<https://safetyculture.com/topics/wind-turbine-maintenance/>



WIND TURBINE MAINTENANCE TECHNOLOGY & ENGINEERING:

IN RELATION TO THE ABOVE-NOTED SUBJECT, I HAVE BECOME AWARE THAT IOWA LAKES COMMUNITY COLLEGE IN ESTHERVILLE, IOWA, MY HOMETOWN IN NORTHWESTERN IOWA, OFFERS STUDIES/CERTIFICATION IN THESE PROGRAMS!! PLEASE SEE THE FOLLOWING LINKS:

[Wind Energy & Turbine Technology Technician Diploma - Iowa Lakes Community College](#)

[Wind Energy & Turbine Technology, AAS - Iowa Lakes Community College](#)

CERTAINLY THE FUTURE JOB MARKET FOR THESE DISCIPLINES WILL CONTINUE TO GROW!!



FreeSignPrinter.com

DECOMMISSIONING WIND TURBINES

<https://cleanpower.org/wp-content/uploads/2021/01/Decomissioning-Fact-Sheet.pdf>

NOTE: As noted in the above link, when wind turbines reach the end of their useful lives (normally when on-going maintenance costs exceed expectations and/or a land lease on which a turbine is installed expires), the wind turbines are “decommissioned” and removed. The method of removal for on-shore turbines is generally via imploding (blowing up) the whole structure and then removing/recycling the debris! The following web site leads to a video that contains a composite of these quite incredible implosions:

<https://www.youtube.com/watch?v=1Jv71D1NxDE>

!KaBOOM!!

SALVAGING WIND TURBINE BLADES

<https://www.sciencedirect.com/science/article/pii/S2452223622001584>



BIG Job!

WIND TURBINE COMPLAINTS FROM IOWANS

<https://www.desmoinesregister.com/story/money/business/2017/04/21/6-common-complaints-against-iowa-wind-turbines/100706178/>



CONCLUSIONS

I felt this compilation would not be complete without stating just a few of my own conclusions about wind energy, as I have learned; so, here's what I think:

-Both wind turbines and solar cells have some impacts on the environment when manufacturing, construction, installations, disposal of expended parts and many other factors are all considered!

-From my "layman's perspective of a "cost/benefit analysis": even though the cost of wind turbine installations far overshadow those of solar panels, wind turbines produce much more energy and as such, the "return on investment" period estimate for both is somewhat generally accepted as less than 7 years.

-The idea of conserving electricity via battery storage when wind turbines and solar cells are inactive only results in a loss of energy when it has to be converted from AC-DC-AC via inverters, etc. But, perhaps capturing some energy and losing some during such transformation is better than not capturing any at all!

-Both wind turbines and solar panels have maximum electrical output ratings; however, neither of these normally achieve their maximum ratings due to variables in wind conditions and hours of sunshine.

-There are many "pros and cons" about wind versus solar energy, but such detailed comparisons were never the intent of this compilation, but related discussion could be a good subject for a future article!

THANKS FOR YOUR INTEREST!
ANY COMMENTS?