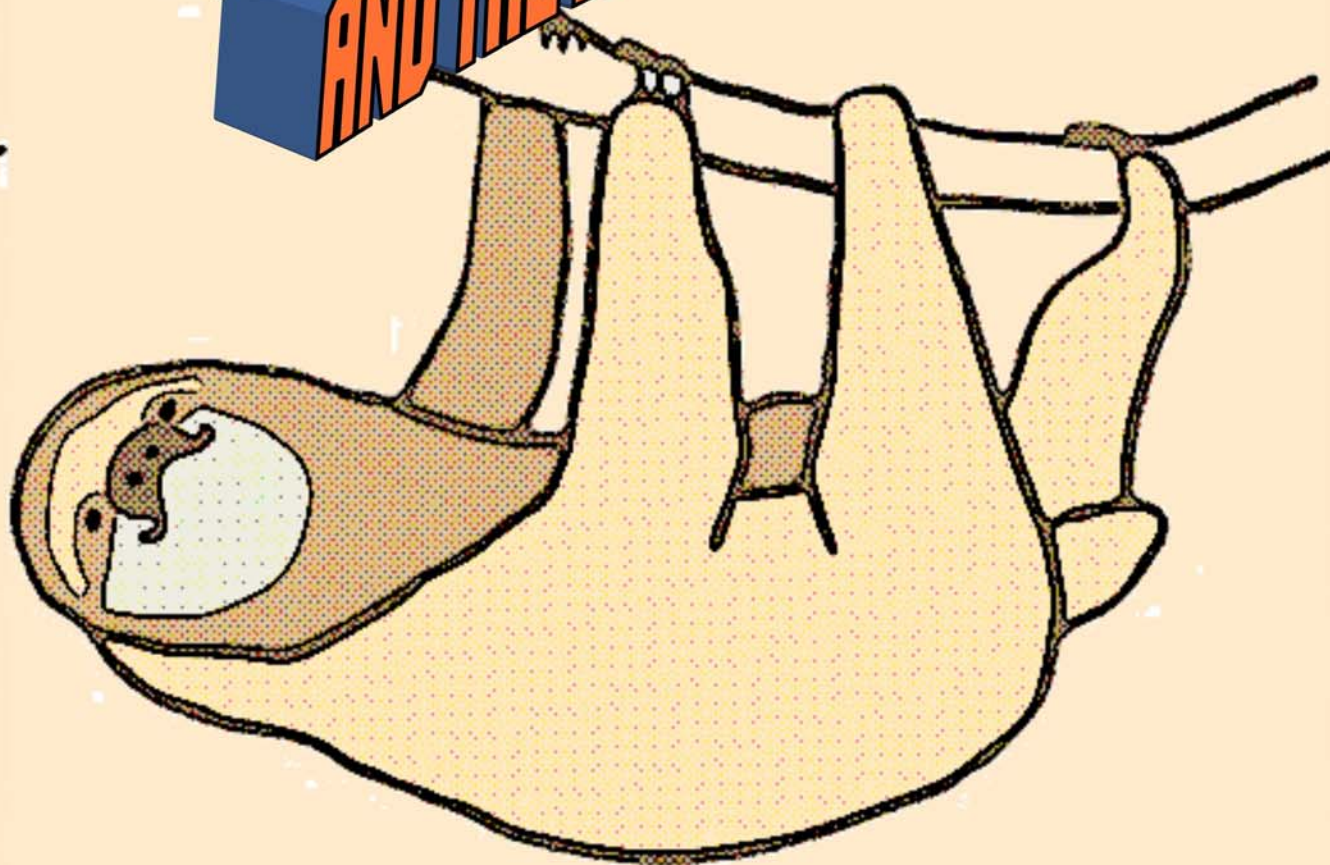


SLOTHERMO AND THE LIMITS OF EFFICIENCY



SLOTHS...



...THEY'RE SLOW

DEEP IN THE JUNGLE...



SON, DO YOU
KNOW WHAT
EFFICIENCY IS?

NOT REALLY.

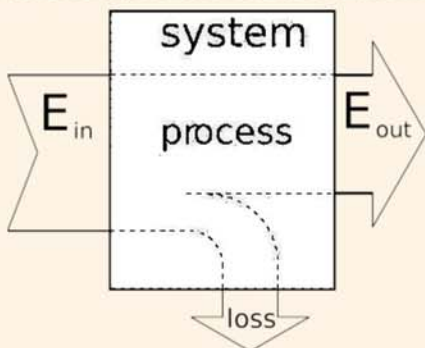
WELL, LET
ME SHOW YOU.

TELEPORTING...

DEEP IN A
CLASSROOM...

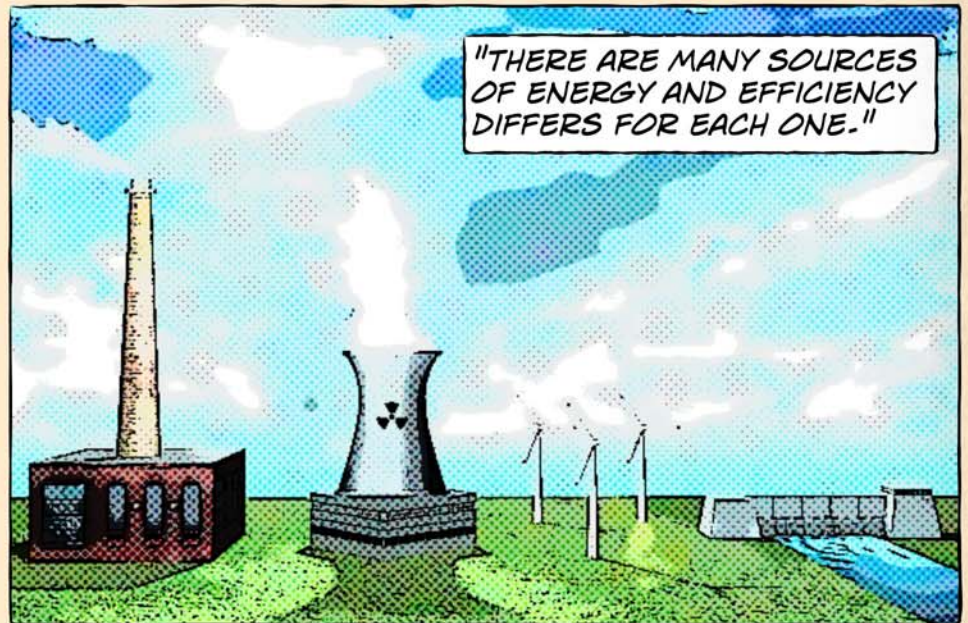
OKAY,
SON, LISTEN
UP.

"EFFICIENCY IS THE AMOUNT OF USEFUL
ENERGY SUPPLIED BY A SYSTEM
COMPARED TO THE ENERGY PUT IN."

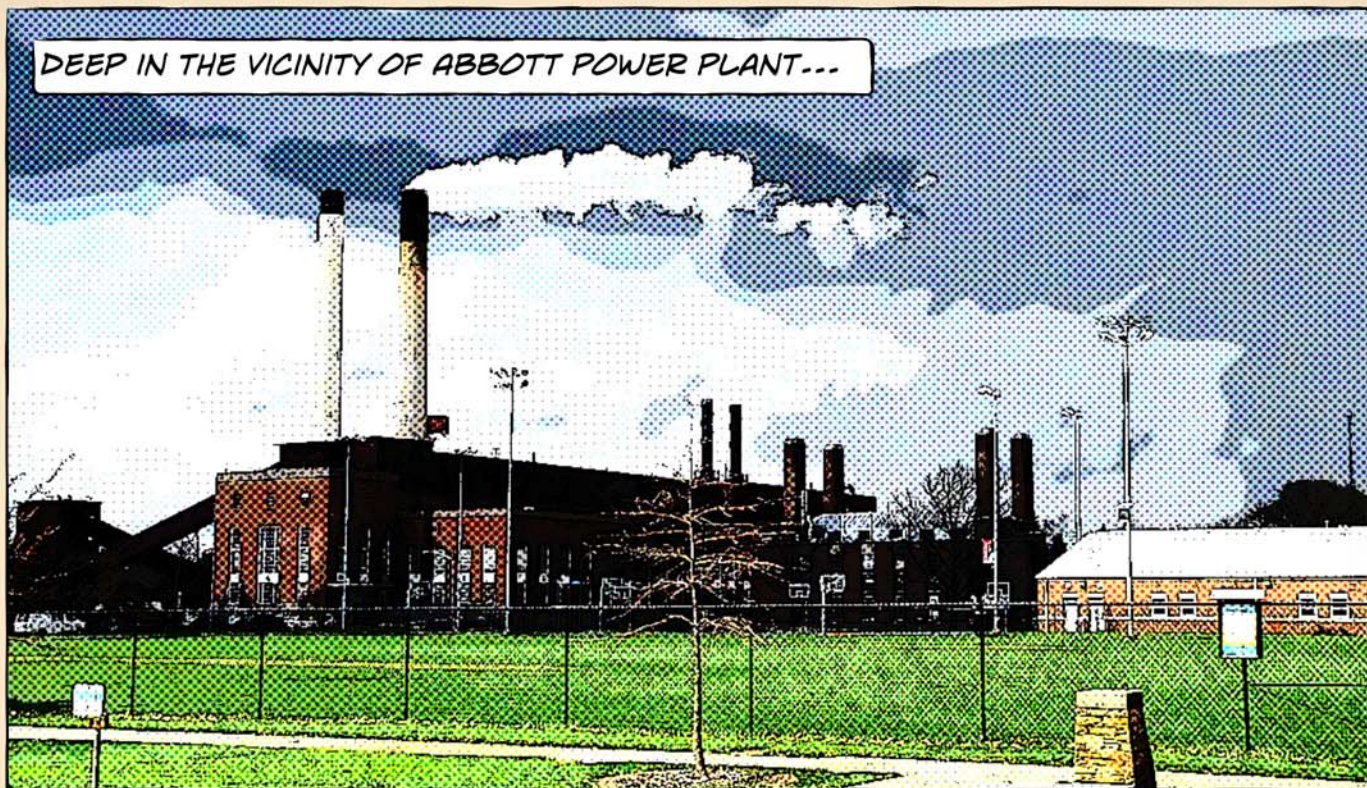


"THE EFFICIENCY CAN NEVER BE 100% DUE
TO SOME ENERGY BEING LOST TO THE
SURROUNDINGS."

DOES THAT
MAKE SENSE,
SON?



DEEP IN THE VICINITY OF ABBOTT POWER PLANT...



HERE WE HAVE THE MAN HIMSELF TO GIVE US A TOUR!

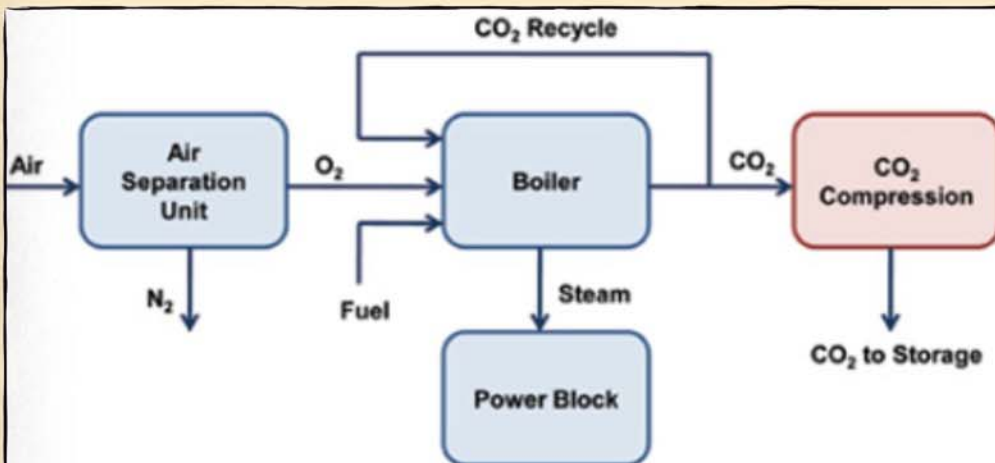
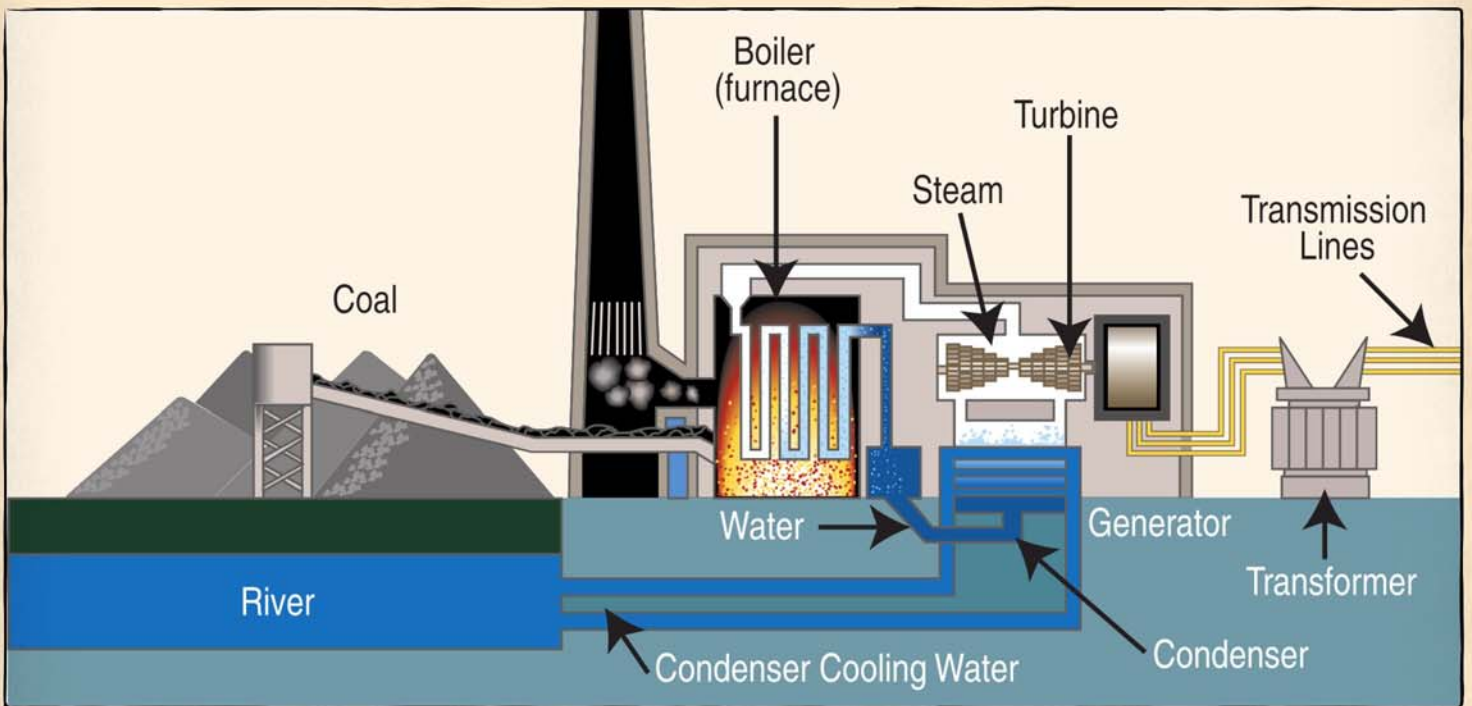
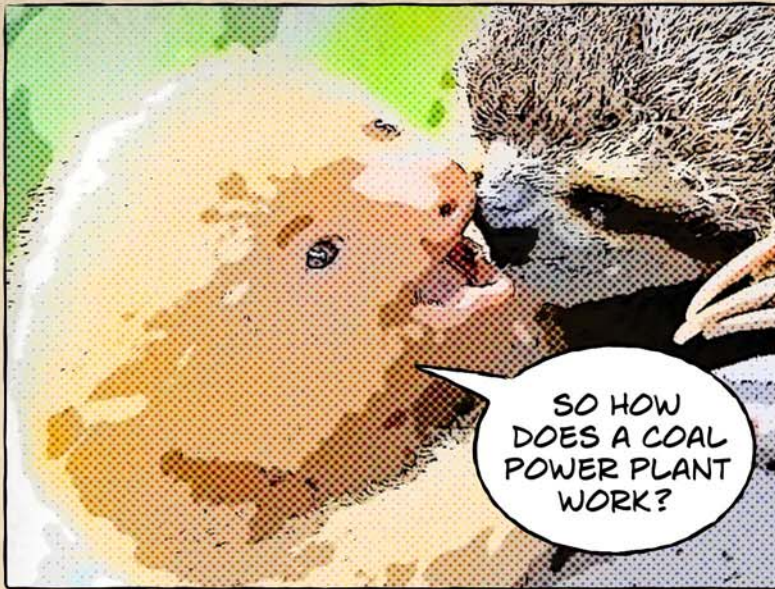


HELLO, GUYS! AHMM, GUYS AND GALS!



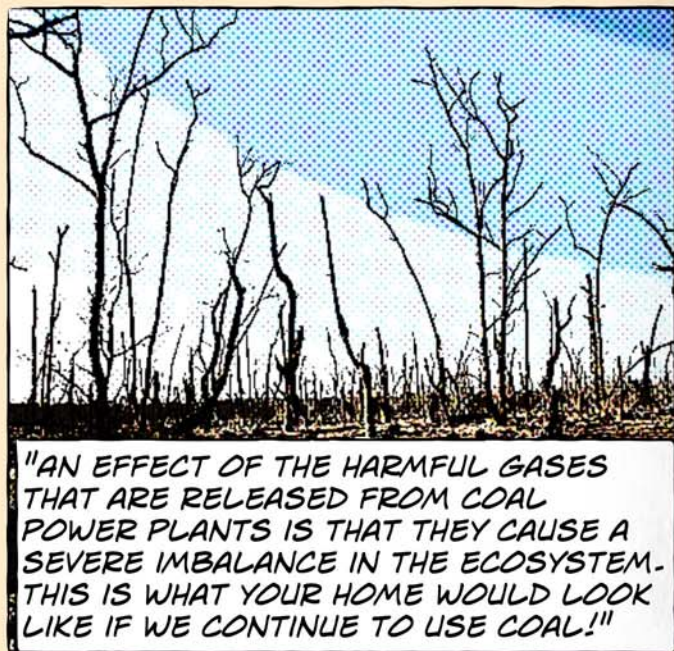
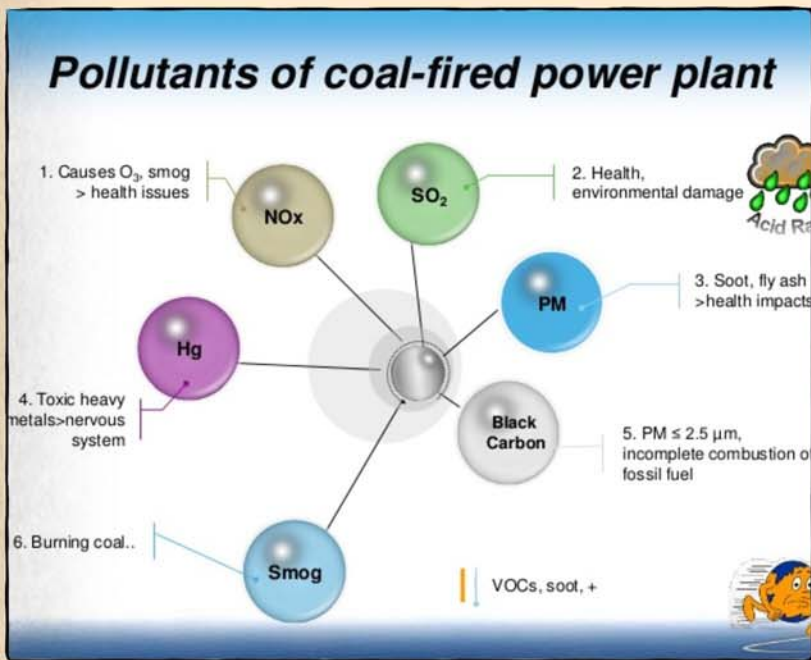
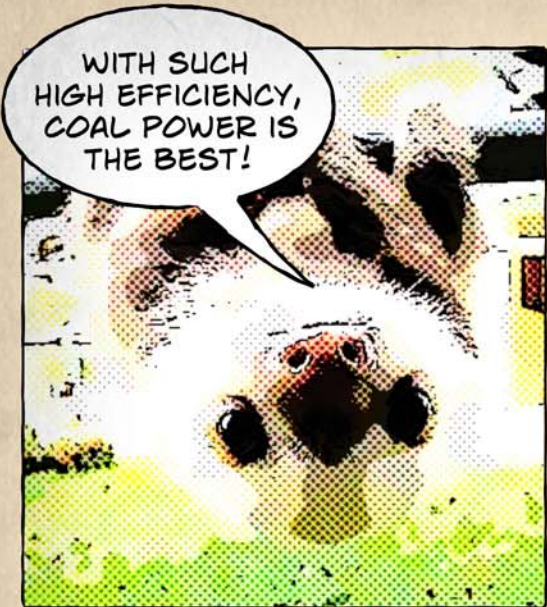
WOW, A CELEBRITY TOUR GUIDE!





"COAL IS BURNED TO PRODUCE HEAT ENERGY, WHICH IS USED TO CONVERT WATER TO STEAM. THIS STEAM IS USED TO TURN THE TURBINE AND PRODUCE ELECTRICAL ENERGY. COAL POWER PLANTS ARE VERY EFFICIENT WITH AN EFFICIENCY OF 65%. IMAGINE THAT!"

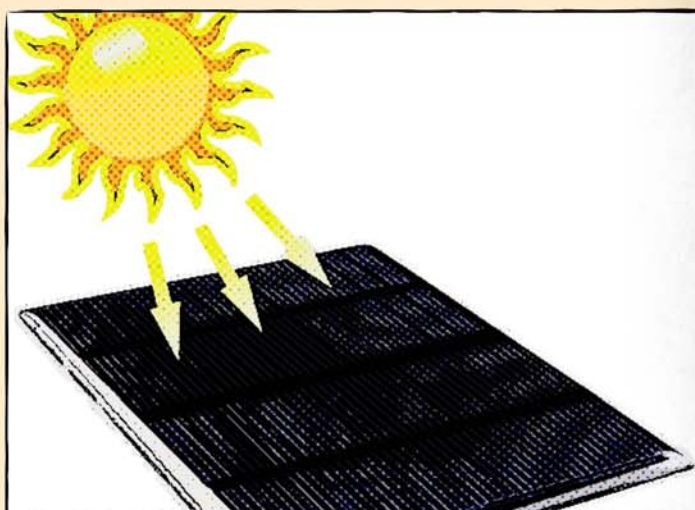




DEEP IN A SOLAR FARM...



WOW! WHAT ARE THOSE THINGS?

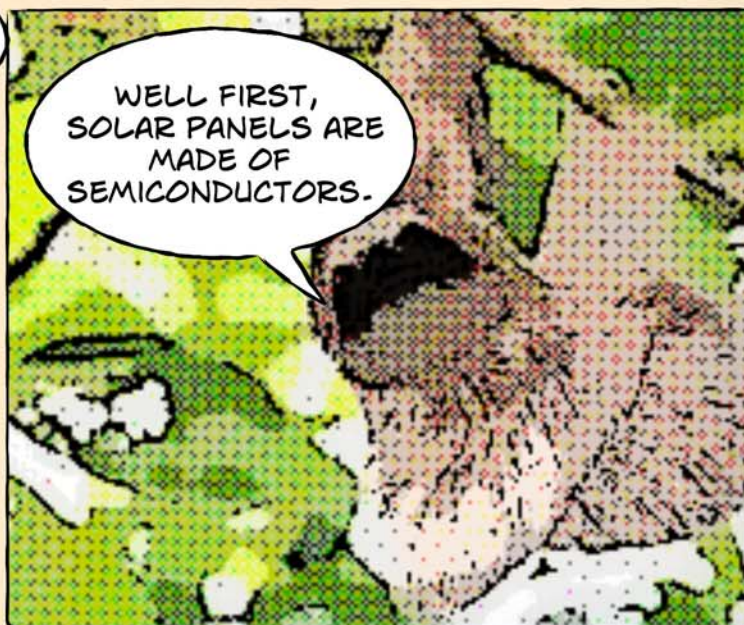


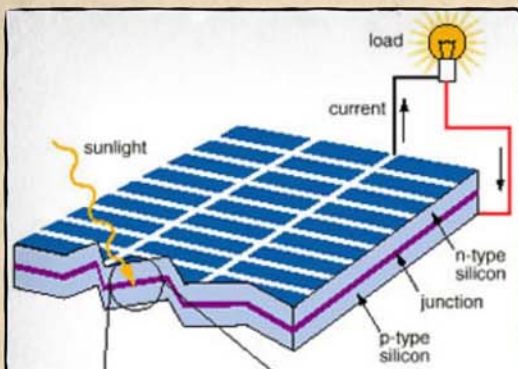
"THOSE ARE SOLAR PANELS. THEY ARE USED TO CONVERT SUNLIGHT INTO ELECTRICITY."

HOW DO THEY DO THAT?



WELL FIRST, SOLAR PANELS ARE MADE OF SEMICONDUCTORS.





"WHEN ENERGY FROM SUNLIGHT REACHES THESE SEMICONDUCTORS, IT EXCITES THE ELECTRONS, CAUSING THEM TO FLOW. THIS FLOW IS ELECTRICAL CURRENT."



WHY DON'T WE USE THESE EVERYWHERE?



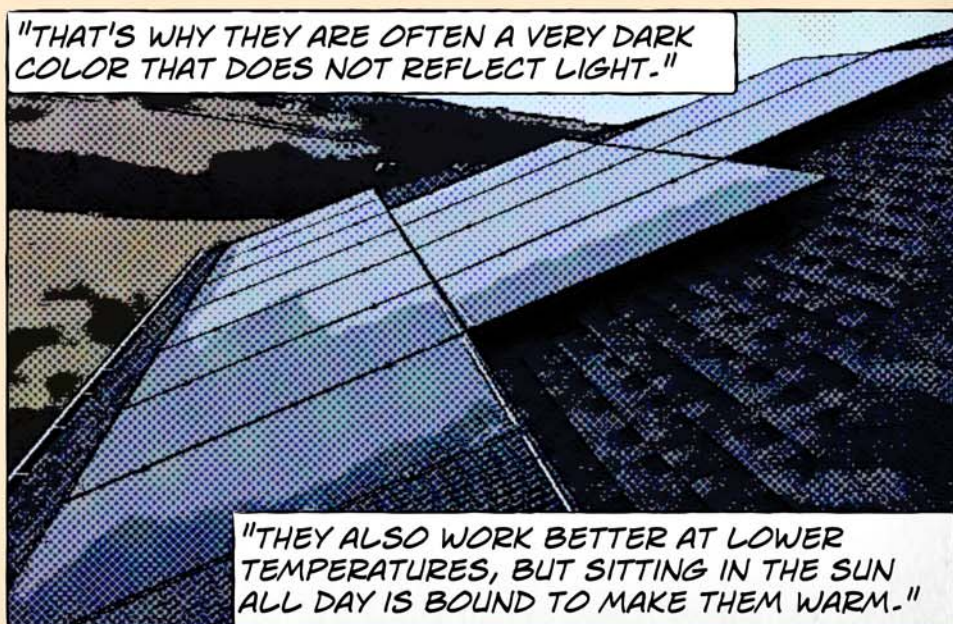
UNFORTUNATELY, SOLAR CELLS ARE USUALLY ONLY 10-15% EFFICIENT.



10%? WHERE DOES THAT ENERGY GO?



WELL, SOME OF THE LIGHT THAT COMES IN CAN BE REFLECTED.

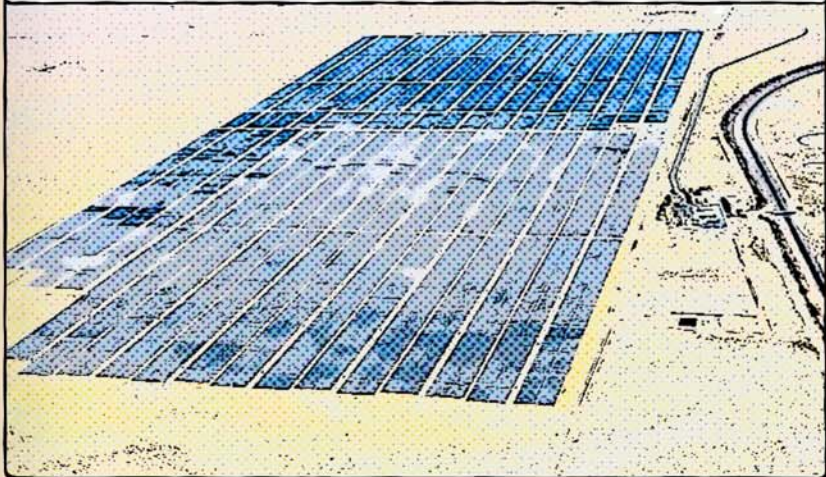


"THAT'S WHY THEY ARE OFTEN A VERY DARK COLOR THAT DOES NOT REFLECT LIGHT."

"THEY ALSO WORK BETTER AT LOWER TEMPERATURES, BUT SITTING IN THE SUN ALL DAY IS BOUND TO MAKE THEM WARM."



"TYPICALLY, LARGE SOLAR FARMS ARE BUILT IN PLACES WHERE IT IS VERY SUNNY. THEY ARE MOST USEFUL NEAR THE EQUATOR WHERE THE SUNLIGHT IS MOST DIRECT."



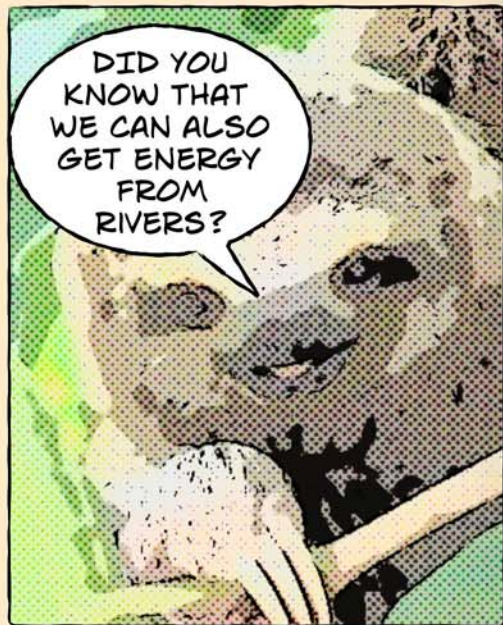
DEEP UNDER WATER...



HEH, **WATER**
WE DOING DOWN
HERE?



DID YOU
KNOW THAT
WE CAN ALSO
GET ENERGY
FROM
RIVERS?

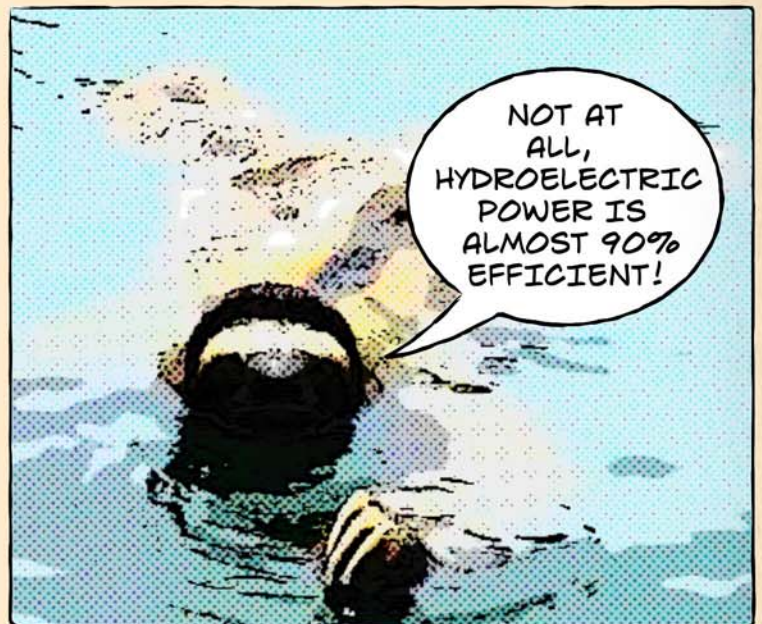


WHY
BOTHR
WHEN THERE
ARE ALL THESE
OTHER
OPTIONS?



"THE NEAT THING ABOUT RIVERS IS THAT
THEY CAN PROVIDE A CONSTANT
SOURCE OF ENERGY."







"...AND THEN YOU NEED A RESERVOIR TO STORE ALL THE DAMMED UP WATER."



THAT REALLY LIMITS WHERE YOU CAN PUT IT!



AND THAT'S NOT EVEN THE WORST PART!

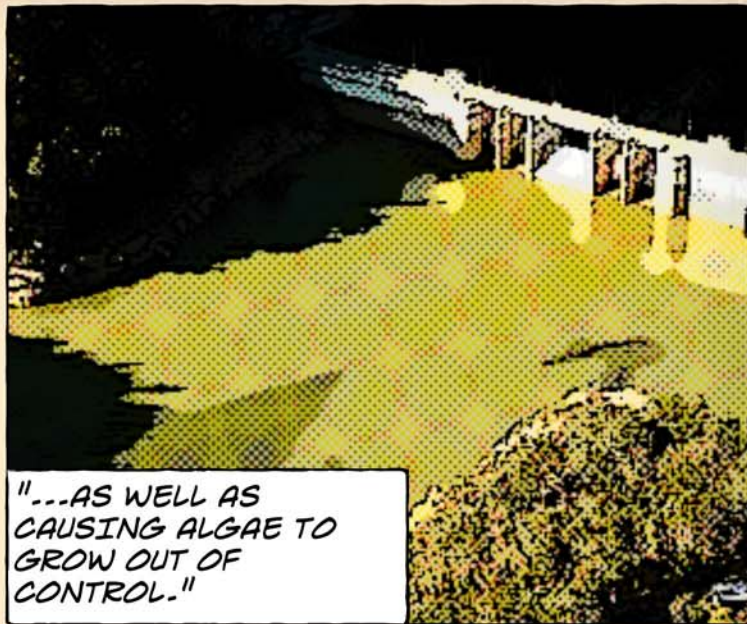
"THE FLOODING CAUSED BY DAMS CAN DISPLACE HUNDREDS OF THOUSANDS OF PEOPLE FROM THEIR HOMES."



"DAMS CAN WREAK
HAYOC ON LOCAL
ECOSYSTEMS..."



"...AS WELL AS
CAUSING ALGAE TO
GROW OUT OF
CONTROL."



BUT DESPITE
ALL THAT, DAMS
DON'T CAUSE
HARMFUL
GREENHOUSE
GASES.



WOW,
HYDROELECTRIC
POWER SEEMS
REALLY NEAT!

YEP,
LET'S TAKE A
LOOK AT SOME
MORE GREEN
ENERGY.



TELEPORTING...





DEEP IN
A WIND
FARM...



THEY ARE
QUITE BIG.

WELL,
SON, THOSE
ARE WIND
TURBINES.

TALLER THAN THE STATUE

Empire State
Building
1,454 ft

OF LIBERTY

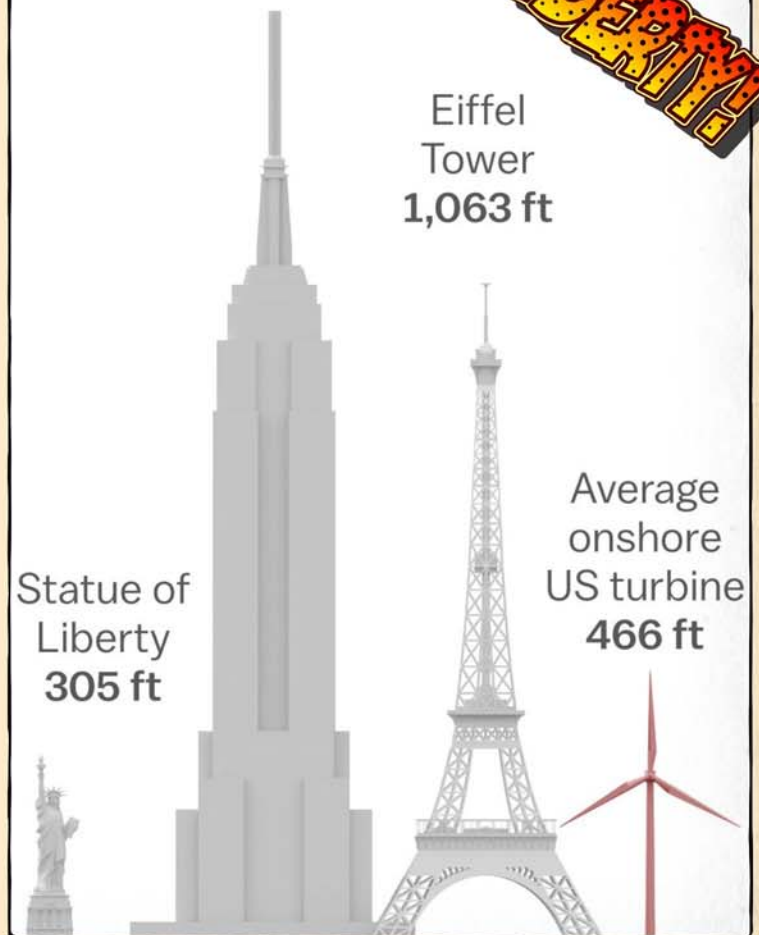
Eiffel
Tower
1,063 ft

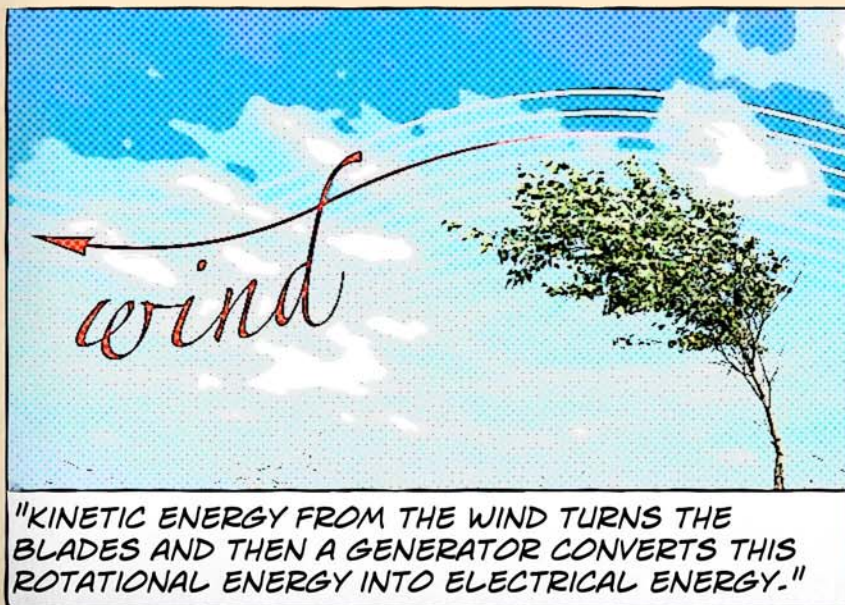
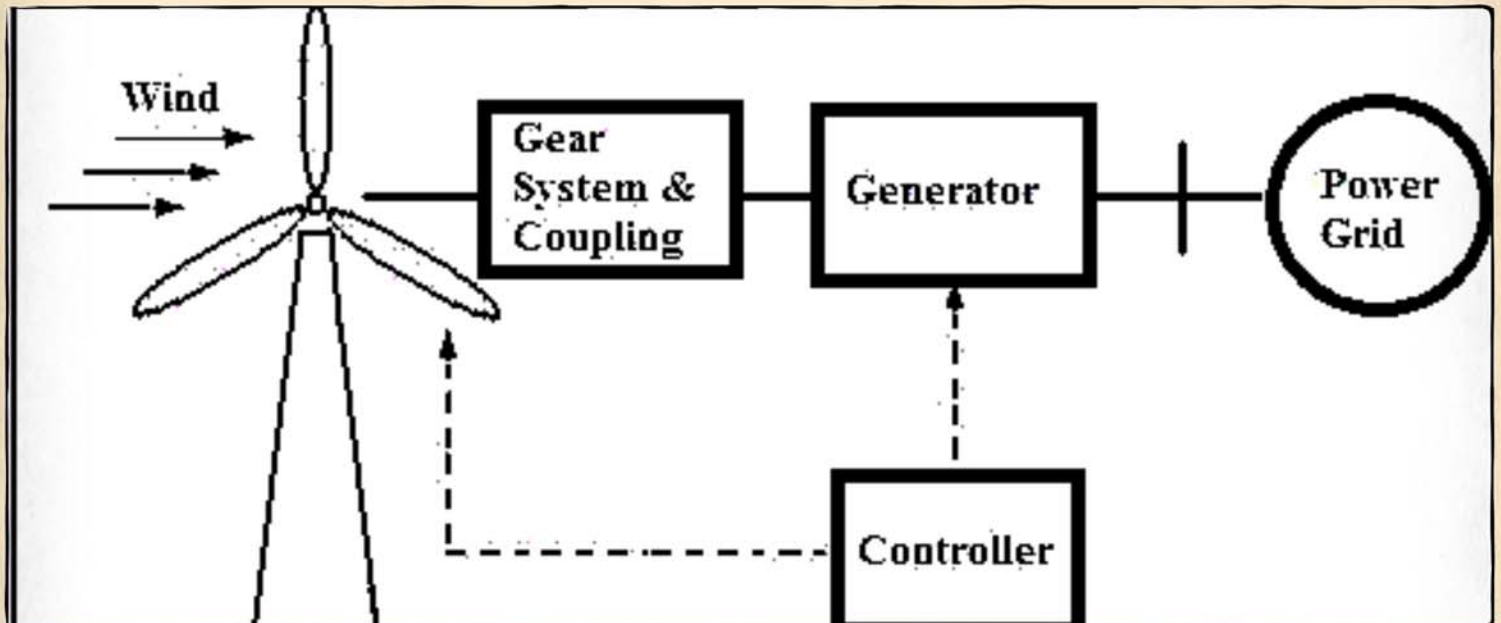
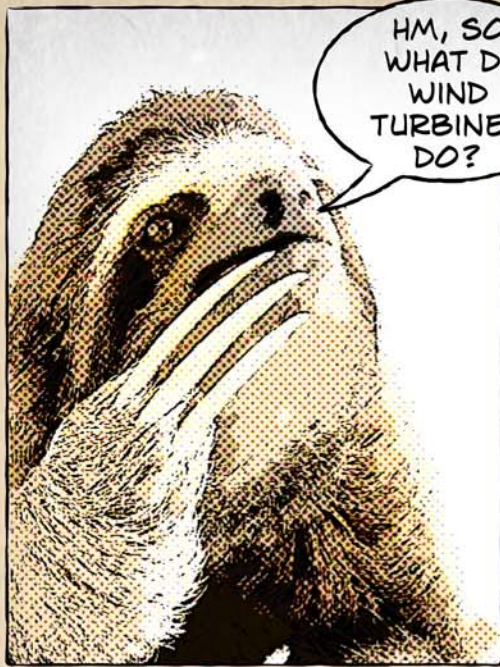
Statue of
Liberty
305 ft

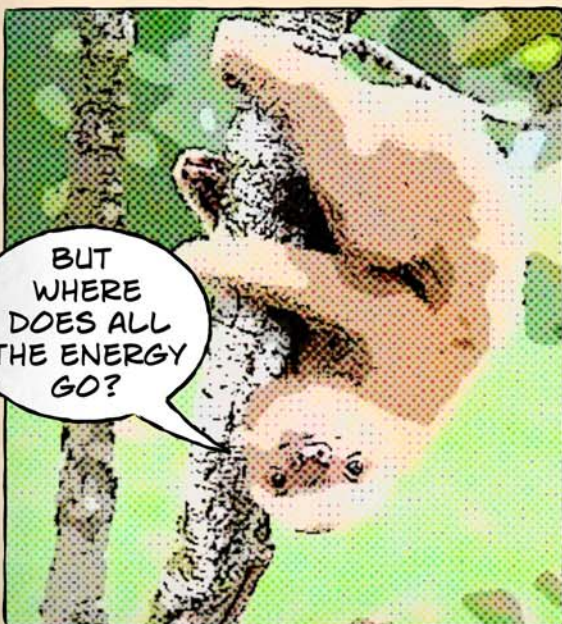
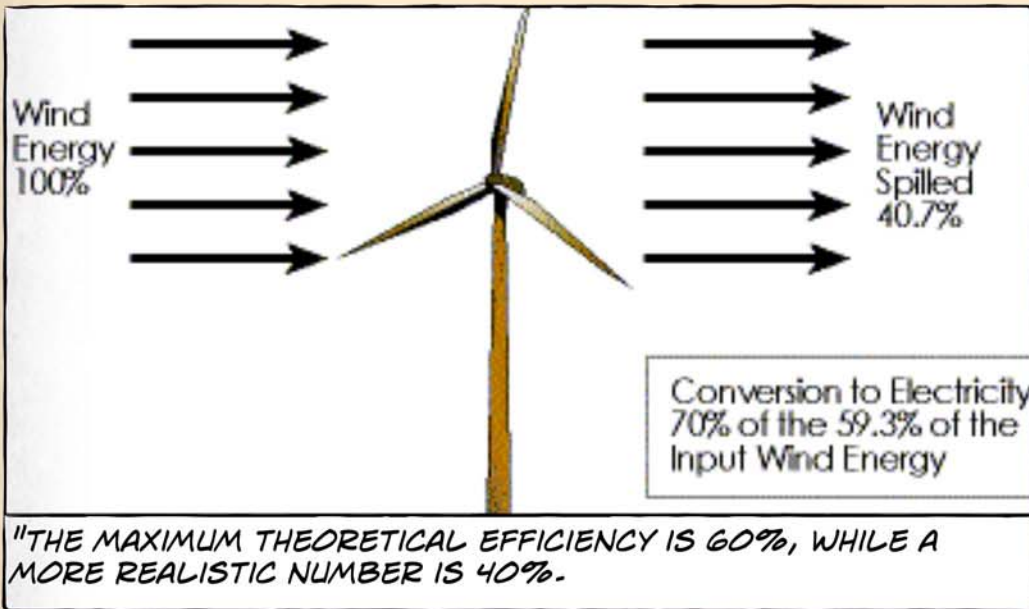
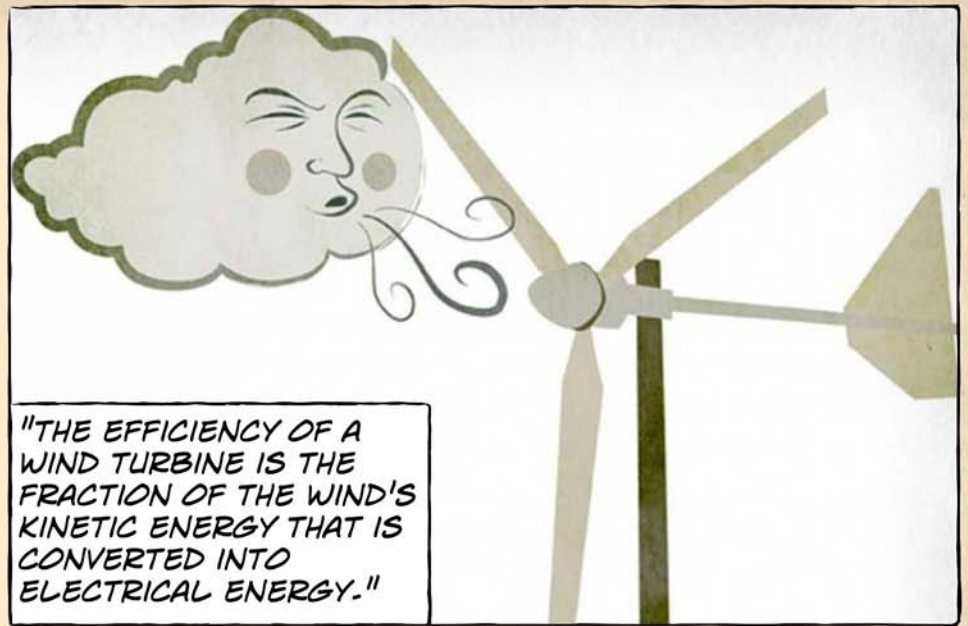
Average
onshore
US turbine
466 ft



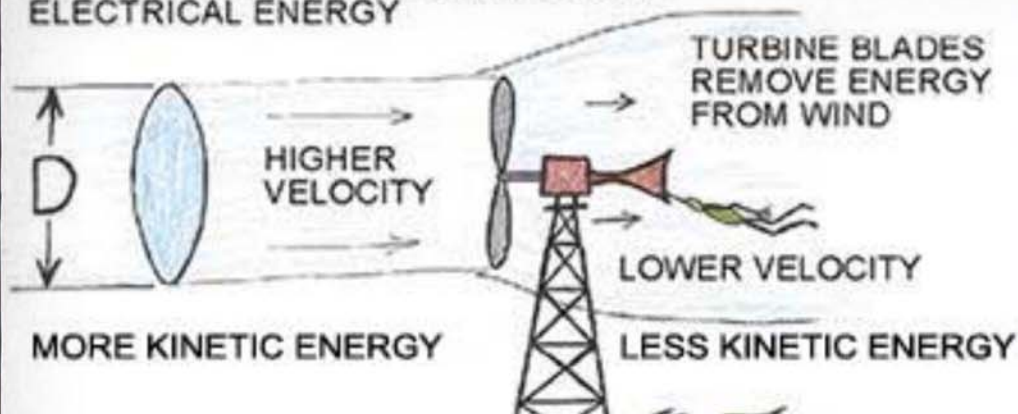
WOW,
DAD! WHAT ARE
THOSE? THEY'RE
HUUUGE!





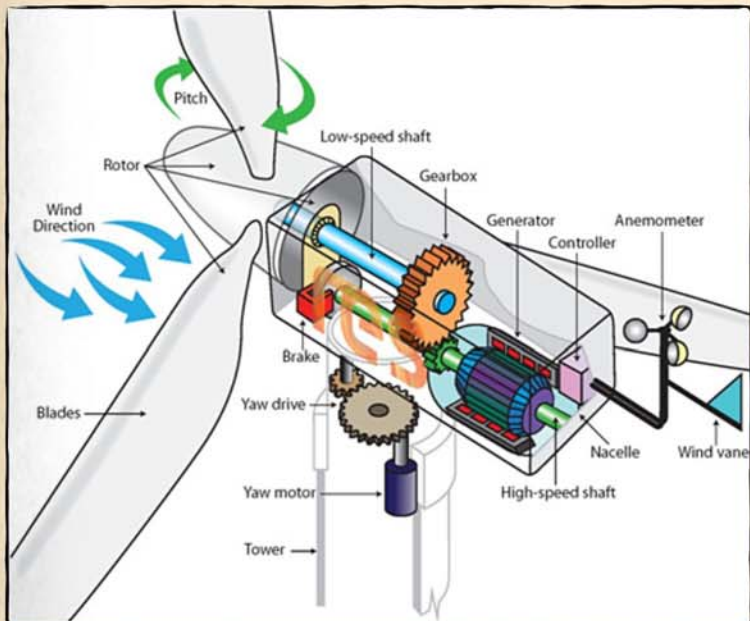


A WIND TURBINE CONVERTS KINETIC ENERGY IN THE WIND INTO MECHANICAL AND ELECTRICAL ENERGY



"MOST OF THE ENERGY LOSSES ARE DUE TO THE TURBINE NOT BEING ABLE TO DRAW ALL OF THE ENERGY OUT OF THE AIR. THE AIR SLOWS DOWN BUT IS STILL MOVING, MEANING IT STILL HAS ENERGY THAT HAS NOT BEEN CAPTURED."

THERE IS ALSO FRICTION FROM ALL OF THE MOVING PARTS.

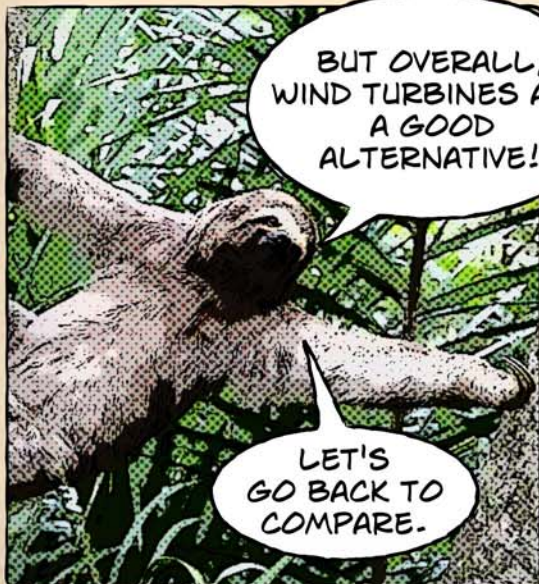


"SOME PEOPLE DON'T LIKE HOW WIND TURBINES LOOK ON THEIR LAND OR ARE CONCERNED ABOUT THE BIRDS GETTING HURT."

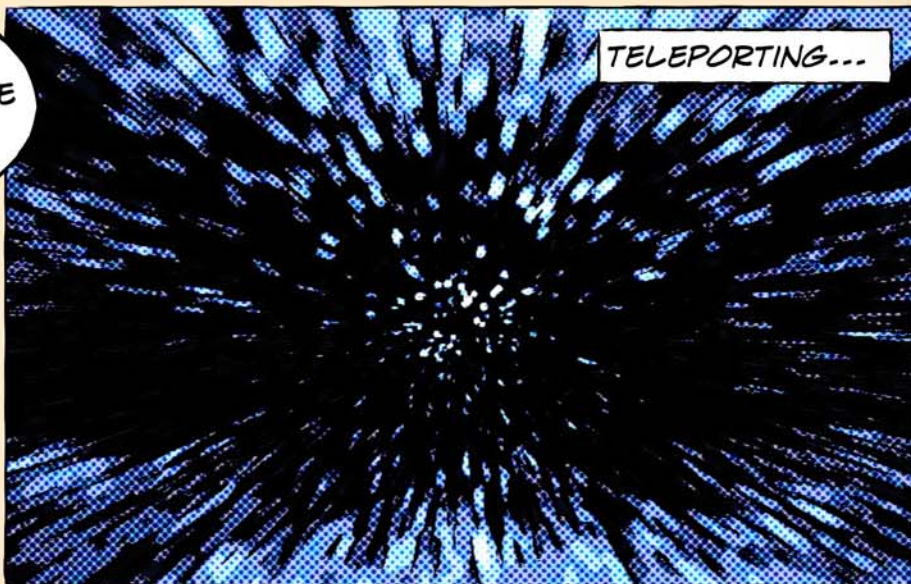


BUT OVERALL, WIND TURBINES ARE A GOOD ALTERNATIVE!

LET'S GO BACK TO COMPARE.



TELEPORTING...





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