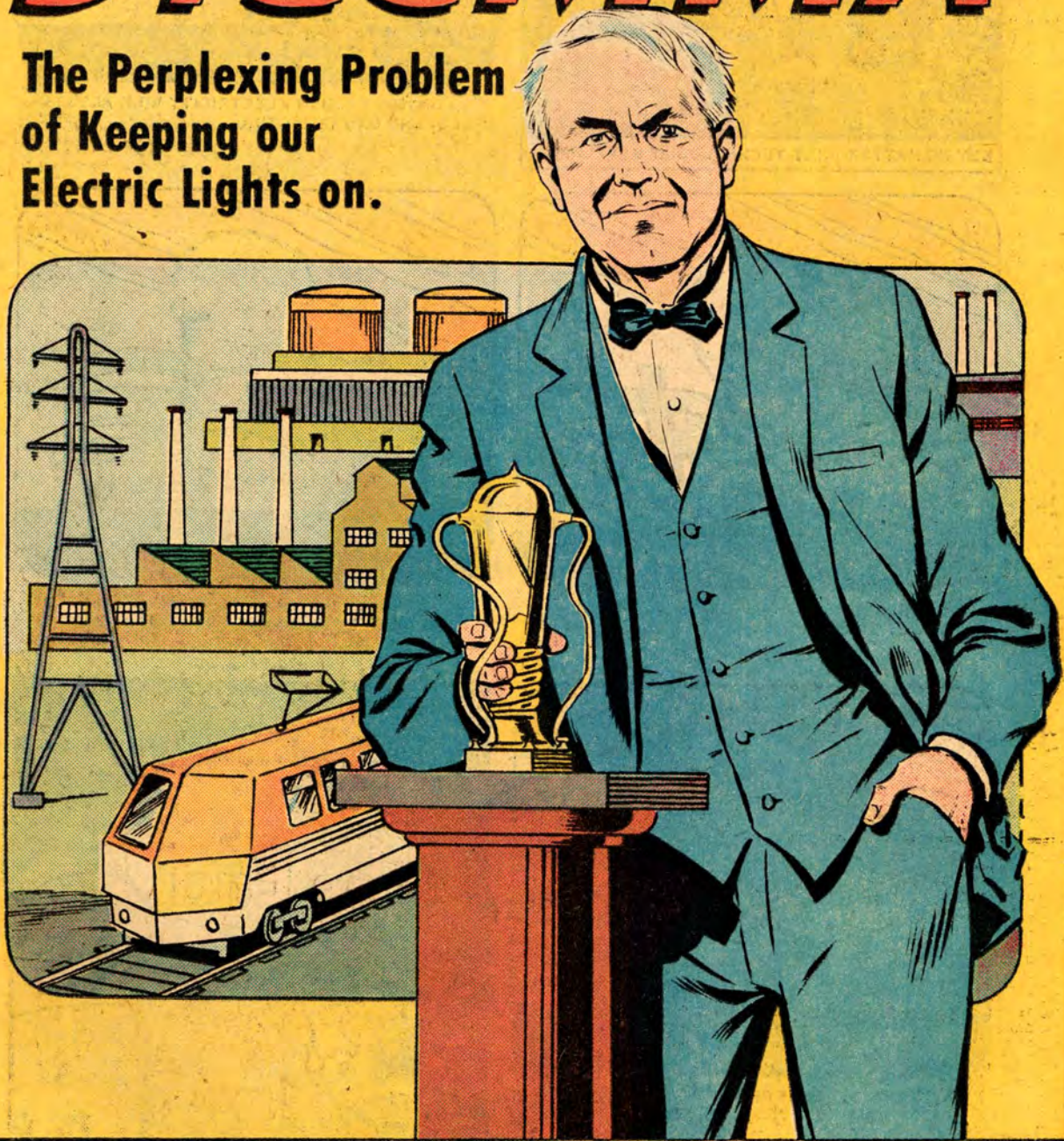
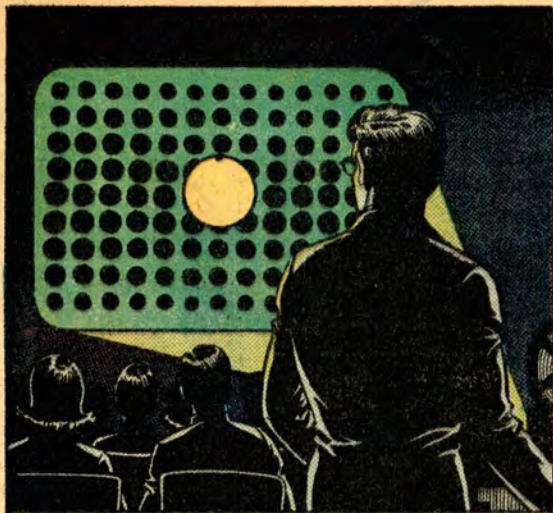


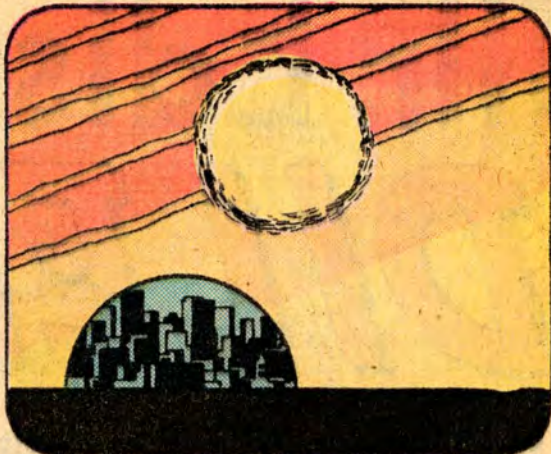
Mr. Edison's *DILEMMA*

The Perplexing Problem
of Keeping our
Electric Lights on.

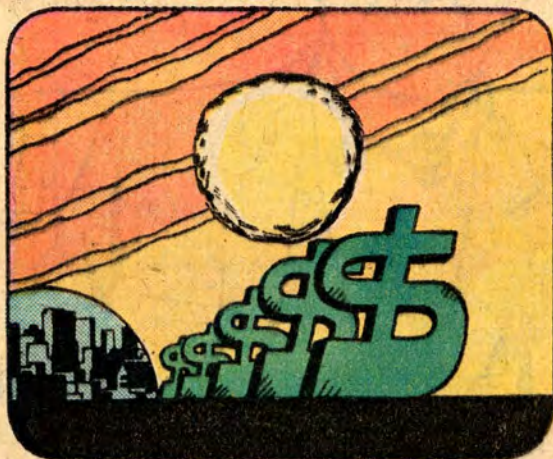




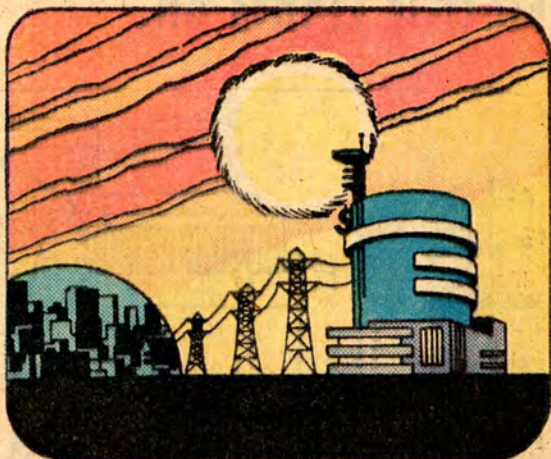
BUT NO MATTER WHAT TECHNOLOGIES DEVELOP...



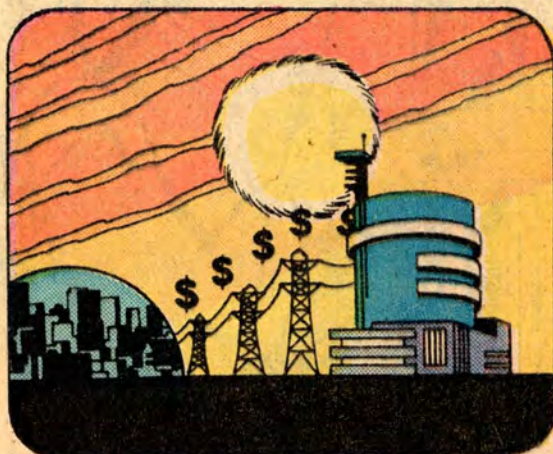
**...HAVING ENOUGH ELECTRICITY WILL ALWAYS
DEPEND ON ATTRACTING...**



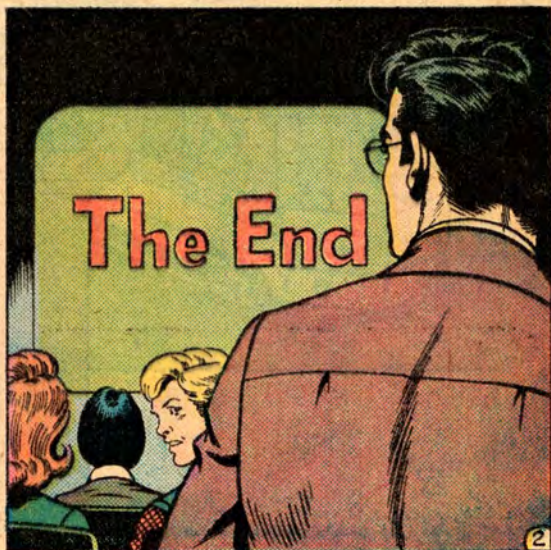
**... TREMENDOUS AMOUNTS OF INVESTMENT
MONEY TO PAY FOR...**

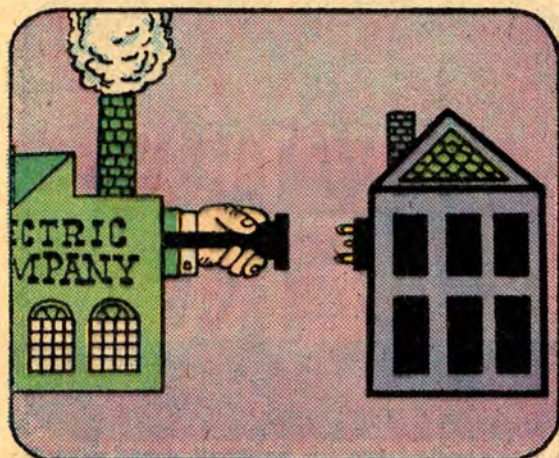
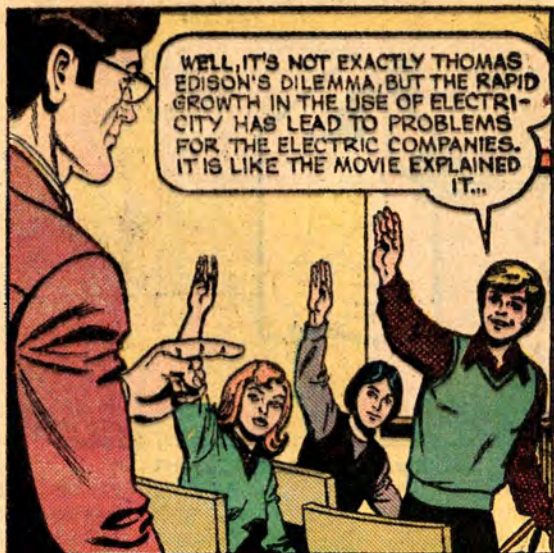


**... WHATEVER GENERATING, TRANSMISSION
AND DISTRIBUTION FACILITIES ARE NEEDED...**

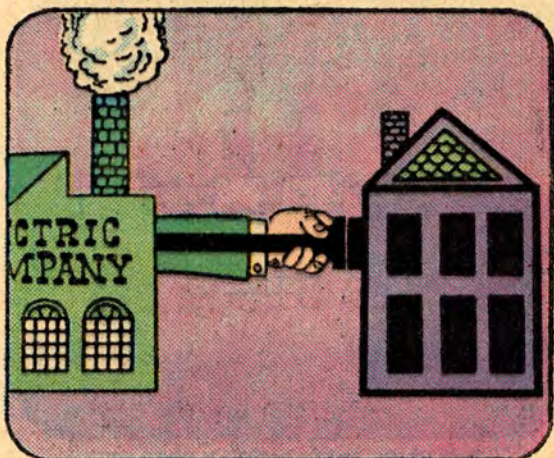


**... WHICH DEPENDS ON PRICES BEING REAL-
ISTICALLY RELATED TO COSTS.**

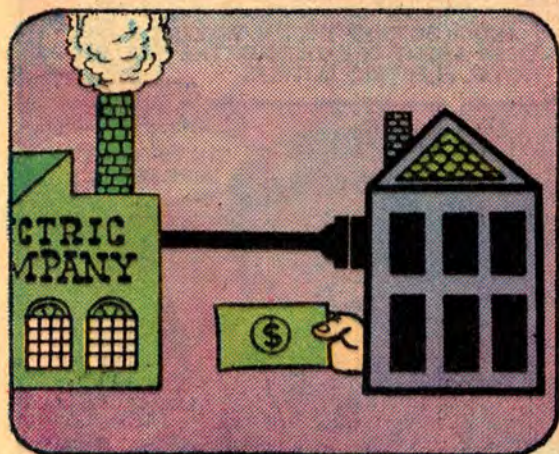




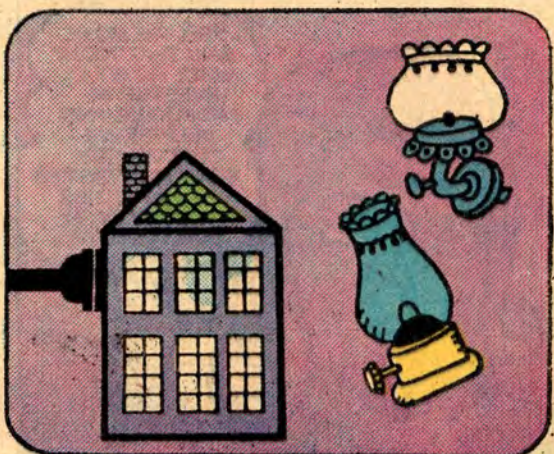
THE WHOLE THING STARTED LESS THAN...



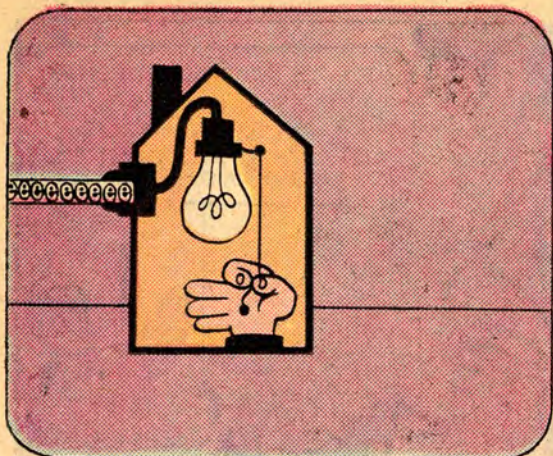
...A HUNDRED YEARS AGO...



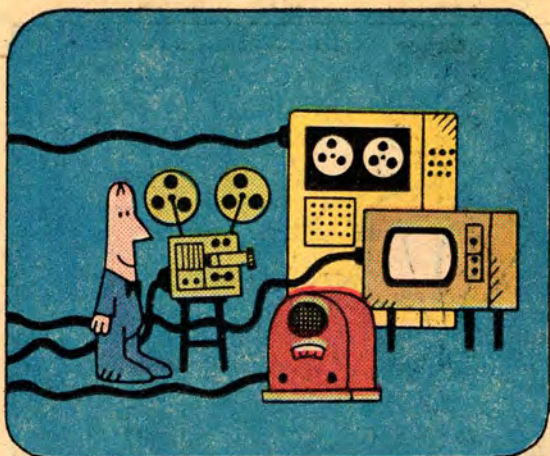
...THE IDEA OF SELLING ENERGY DELIVERED THROUGH WIRES.



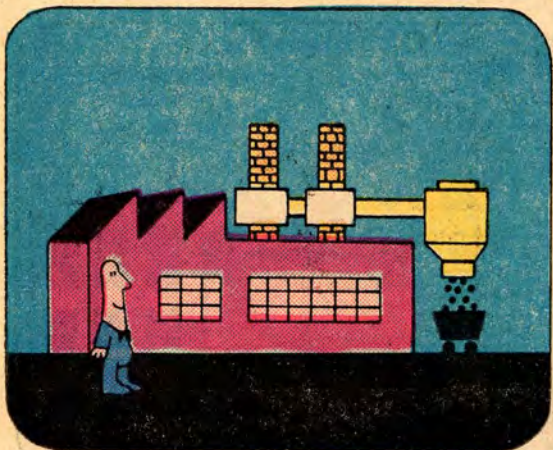
OIL LAMPS AND GAS LIGHTS...



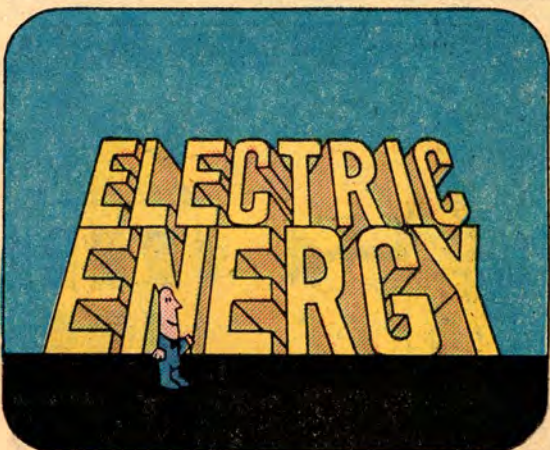
...GAVE WAY TO ELECTRIC LIGHTS.



WITHIN A SHORT TIME, MOVIES, RADIO, TELEVISION, COMPUTERS AND OTHER ELECTRICAL MARVELS BECAME COMMONPLACE...



...INCLUDING ELECTRICALLY OPERATED POLLUTION CONTROL SYSTEMS.



OUR ELECTRIC LIGHT AND POWER INDUSTRY HAS HAD TO GROW TREMENDOUSLY TO KEEP PACE WITH THIS ACCELERATING RELIANCE ON ELECTRIC ENERGY.

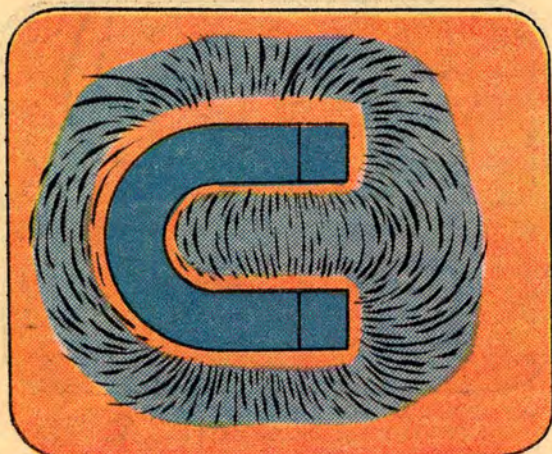
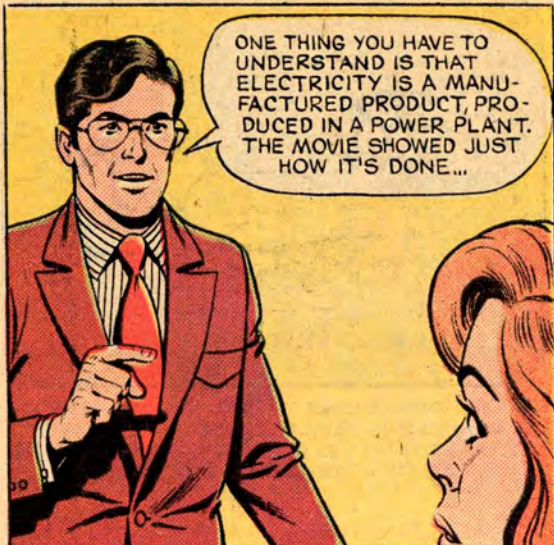


YES, THE MOVIE SAID THAT TODAY MORE MONEY IS INVESTED IN PRODUCING AND DELIVERING ELECTRICITY THAN IS INVESTED IN ANY OTHER INDUSTRY IN OUR COUNTRY.

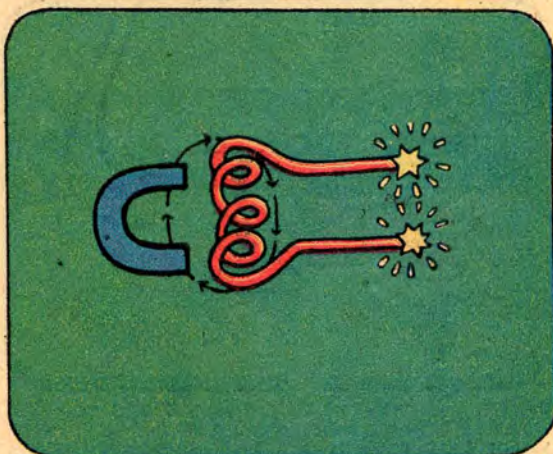


AND ALSO THAT THE U.S. PRODUCES AND USES ABOUT ONE-THIRD OF THE WORLD'S TOTAL ELECTRIC OUTPUT.

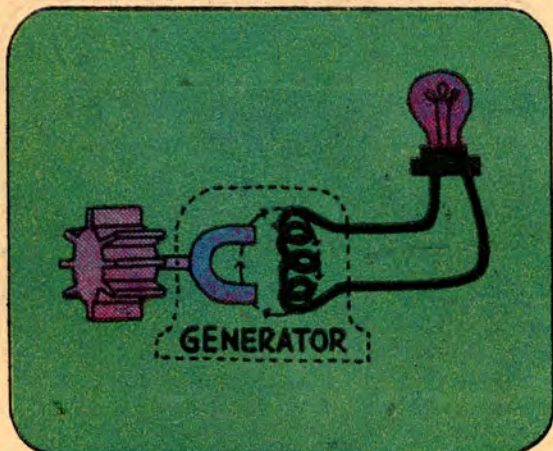
THAT'S PRETTY IMPRESSIVE!



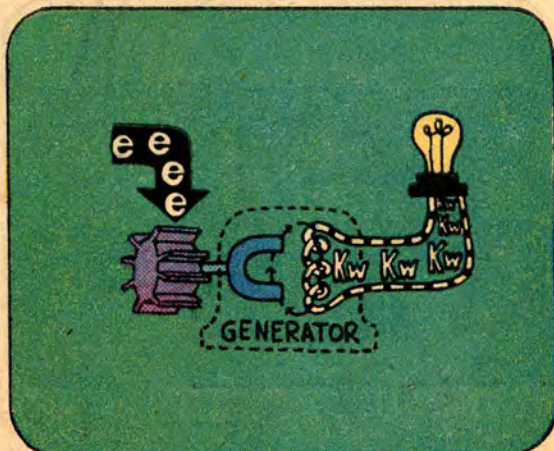
THE MACHINES WHICH MAKE ELECTRICITY ARE CALLED GENERATORS. ALL ELECTRIC POWER GENERATORS UTILIZE THE INVISIBLE FIELD OF FORCE WHICH SURROUNDS A MAGNET.



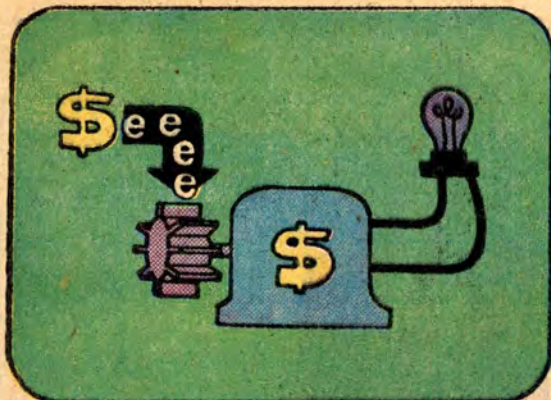
THIS FORCE CREATES AN ELECTRIC CURRENT IN A COIL OF WIRE WHEN THE WIRE, OR THE MAGNET IS IN MOTION.



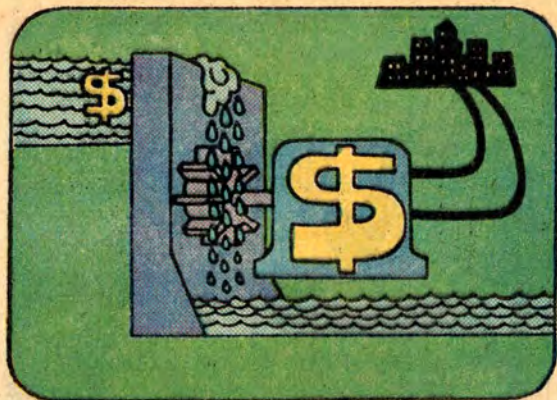
THE CURRENT CAN BE SENT LONG DISTANCES THROUGH WIRES.



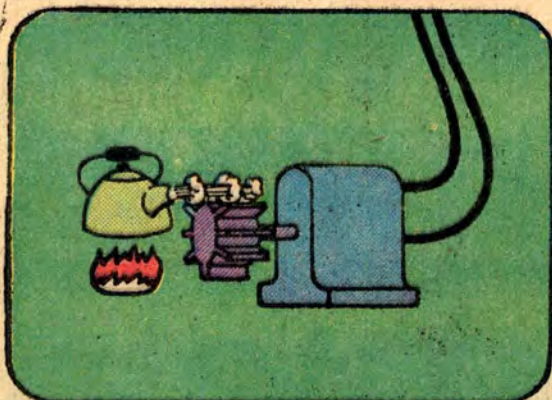
GENERATING ELECTRICITY IS CALLED A CONVERSION PROCESS, BECAUSE A CONSTANT SUPPLY OF SOME OTHER FORM OF ENERGY IS NEEDED TO KEEP THE GENERATOR IN MOTION.



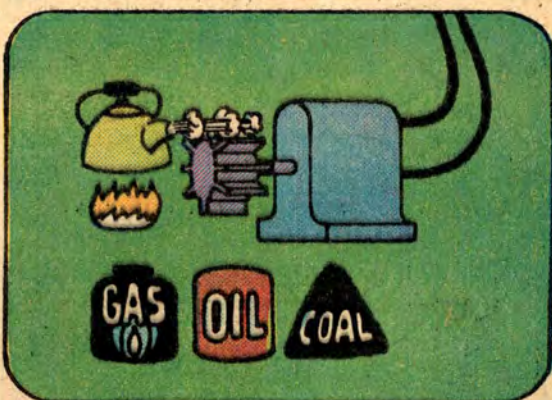
THE COST OF THE ENERGY USED, AND THE COST OF THE GENERATING FACILITIES NEEDED TO CONVERT THAT ENERGY INTO ELECTRICITY, HAVE A GREAT DEAL TO DO WITH THE COST OF ELECTRICITY.



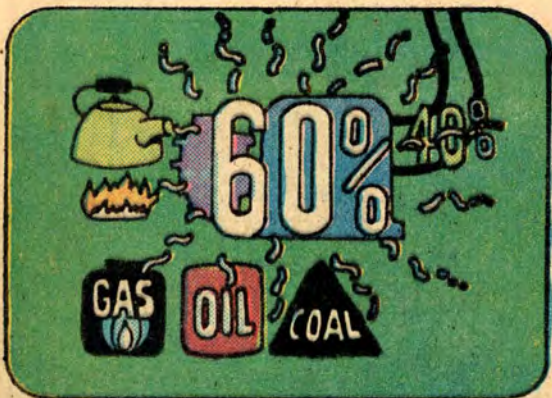
FOR EXAMPLE, THE FORCE OF FALLING WATER IS AN INEXPENSIVE ENERGY SOURCE, ALTHOUGH THE COST OF BUILDING DAMS, FLOODING LARGE AREAS AND TRANSMITTING THE POWER LONG DISTANCES HAS BEEN RELATIVELY HIGH. UNFORTUNATELY, MOST OF OUR HYDRO-ELECTRIC POTENTIAL HAS BEEN DEVELOPED.



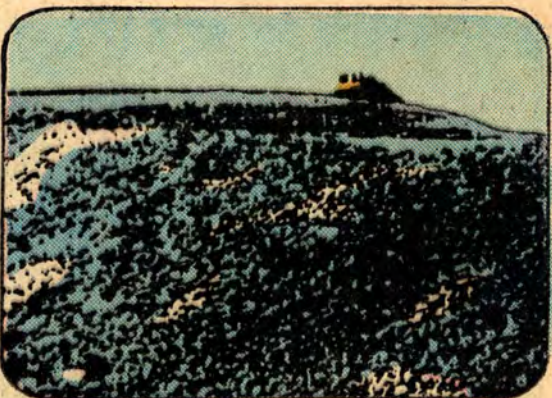
WATER, WHEN HEATED TO STEAM, EXPANDS AND BUILDS PRESSURE WHICH CAN BE DIRECTED AGAINST THE BLADES OF A FAN. MOST OF OUR ELECTRIC POWER IS BEING GENERATED BY STEAM TURBINES, WHICH ARE EFFICIENT, STEAM-DRIVEN FANS.



ANY DEPENDABLE HEAT SOURCE MAY BE USED... LIKE BURNING COAL, OIL OR NATURAL GAS. IN THE "GOOD OLD DAYS" WHEN ALL THESE FUELS WERE CHEAP AND ABUNDANT, IT WAS POSSIBLE TO PRODUCE ELECTRICITY THAT COULD BE SOLD FOR 2¢ PER KILOWATT-HOUR.



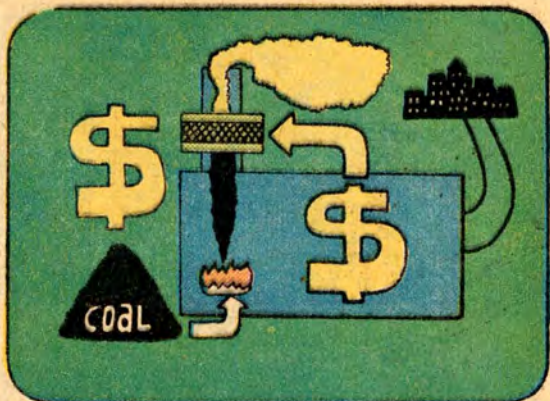
NOW OIL AND NATURAL GAS ARE BECOMING SCARCE AND EXPENSIVE. THE MOST EFFICIENT STEAM GENERATORS OF TODAY DELIVER ONLY ABOUT 40% OF THE RAW ENERGY INPUT AS ELECTRIC ENERGY, THE REST IS LOST IN THE CONVERSION PROCESS. SO OIL AND GAS SHOULD BE PUT TO MORE EFFICIENT USES.



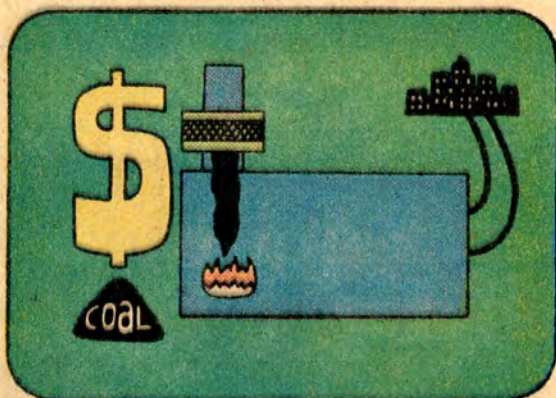
COAL HAS BEEN THE MOST AVAILABLE GENERATING FUEL AND, BECAUSE OUR COUNTRY HAS HUGE RESERVES OF COAL, WILL PROBABLY CONTINUE TO BE AN IMPORTANT FUEL FOR ELECTRICAL CONVERSION FOR MANY YEARS.



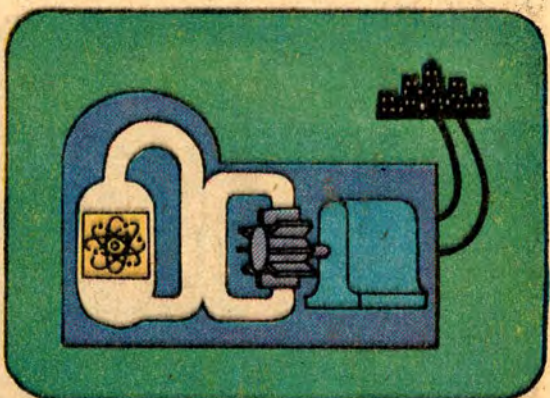
IN THE LAST FEW YEARS, THE COST OF COAL HAS TRIPLED, AND THE PRICE IS EXPECTED TO CONTINUE TO RISE.



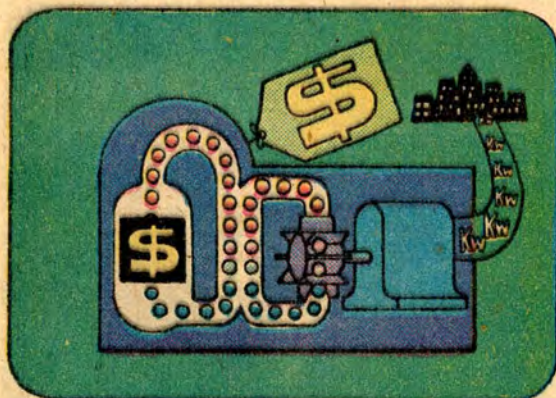
ALSO, MOST COAL CONTAINS SULFUR AND OTHER IMPURITIES. MOST OF THE IMPURITIES CAN BE REMOVED WITH EXPENSIVE STACK GAS CLEANING EQUIPMENT, BUT NO RELIABLE WAY HAS YET BEEN DISCOVERED TO REMOVE SULFUR AND SULFUR PRODUCTS.



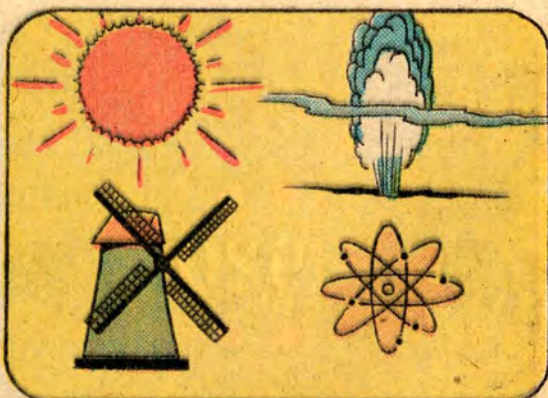
BURNING LOW-SULFUR COAL COULD SOLVE THIS PROBLEM, BUT IT'S SCARCE... AND MUCH MORE EXPENSIVE.



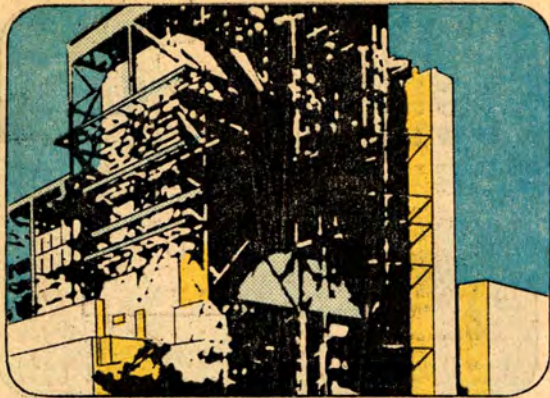
NUCLEAR PLANTS HAVE NO CHIMNEYS.



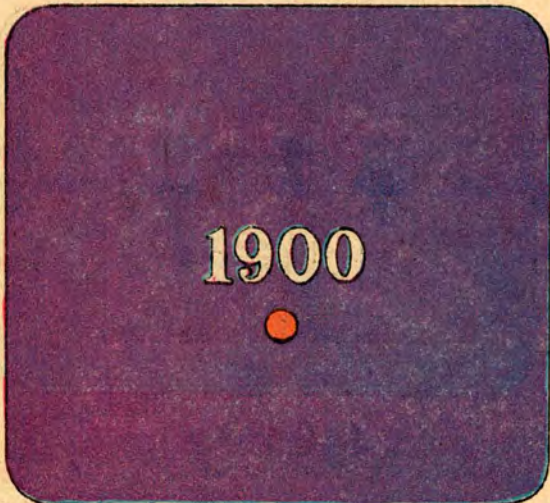
THE HEAT FROM NUCLEAR FISSION DEVELOPED UNDER CONTROLLED CONDITIONS IN A REACTOR IS ANOTHER WAY TO HEAT WATER, TO MAKE STEAM, TO TURN THE TURBINE AND GENERATOR. ALTHOUGH NUCLEAR PLANTS COST MORE TO BUILD THAN OTHER STEAM PLANTS, THEY CAN PRODUCE ELECTRIC ENERGY AT A LOWER COST.



THERE ARE MANY OTHER FORMS OF ENERGY THAT COULD BE CONVERTED INTO ELECTRICITY. HEAT FROM THE SUN, THE FORCES OF WINDS, GEOTHERMAL ENERGY FROM DEEP UNDERGROUND, AND NUCLEAR FISSION ARE JUST SOME OF THE AREAS OF INTENSIVE RESEARCH AND DEVELOPMENT.



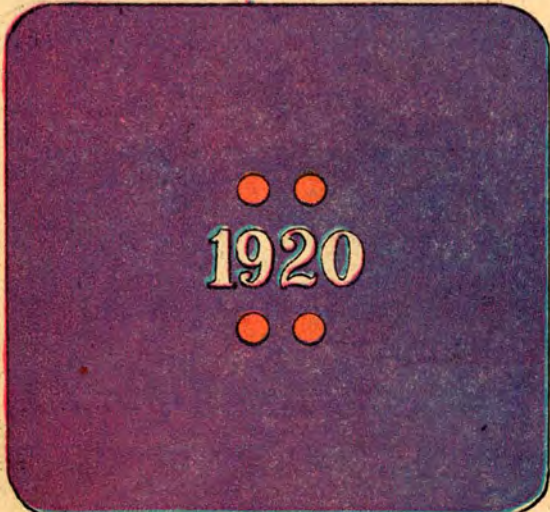
THESE SOURCES COULD BE USED SOMEDAY..WHEN IT CAN BE DEMONSTRATED THAT THEY CAN BE USED TO GENERATE ELECTRICITY DEPENDABLY AT A COST PEOPLE ARE WILLING TO PAY. MEANWHILE OLDER PLANTS ARE WEARING OUT AND NOT ENOUGH NEW ONES ARE BEING BUILT AS WE CONTINUE TO USE MORE AND MORE ELECTRICITY.



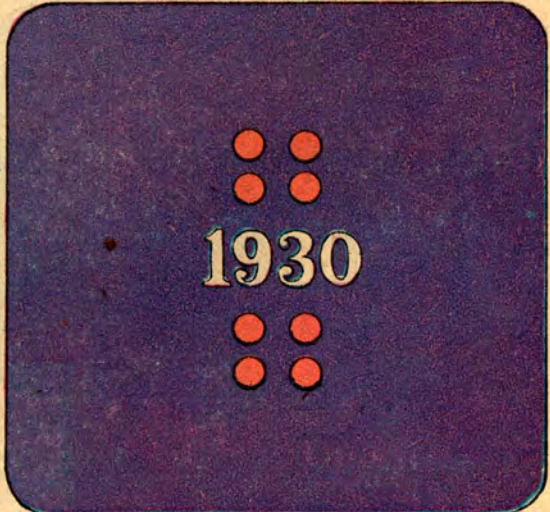
SINCE THE BEGINNING OF THE CENTURY...



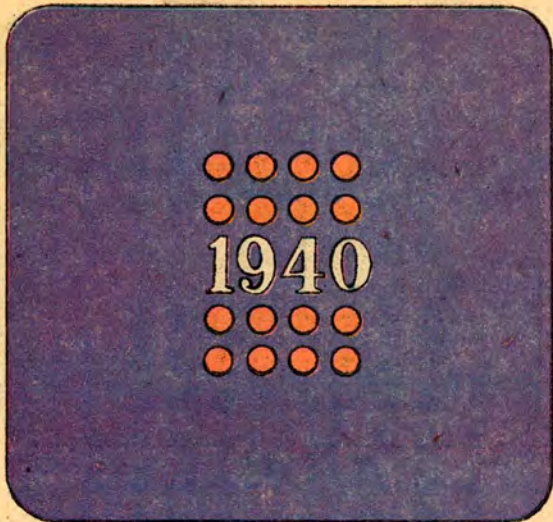
...OUR USE OF ELECTRICITY...



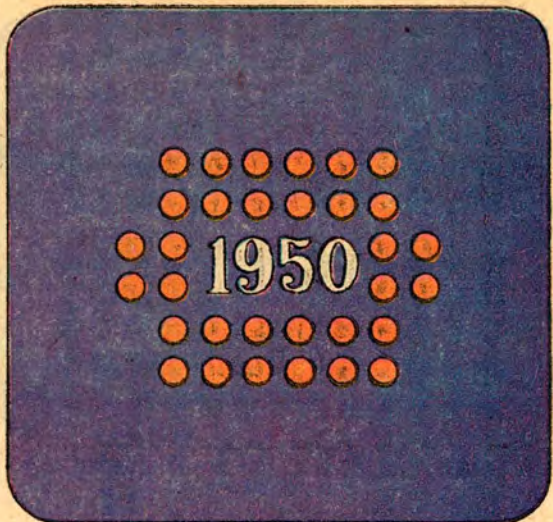
...HAS DOUBLED EVERY TEN YEARS.



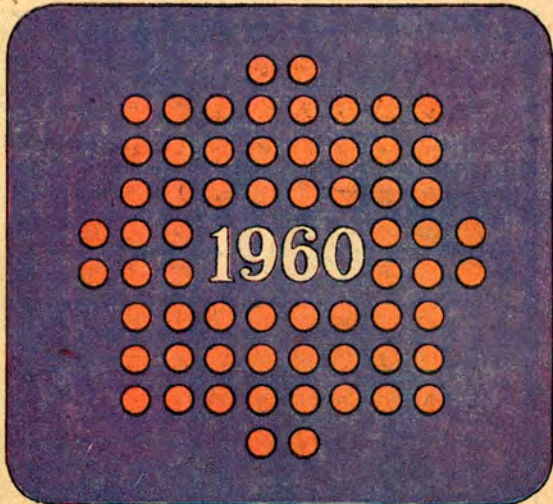
IT IS NOW...



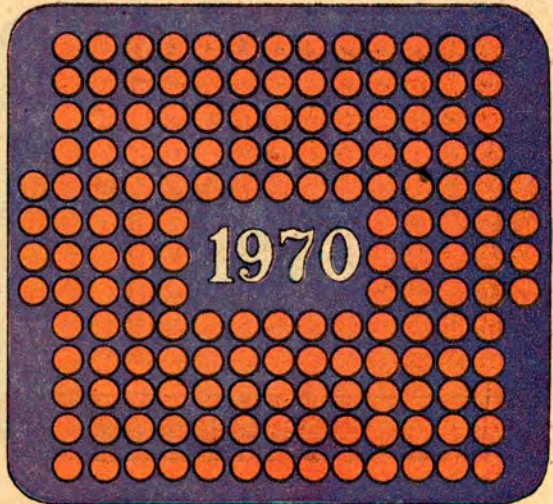
...BECOMING APPARENT...



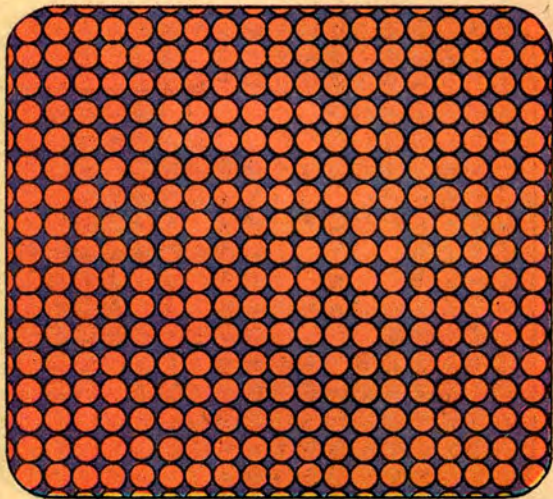
... THAT GROWTH HAS LIMITS...



... AND THAT THIS RATE OF GROWTH...

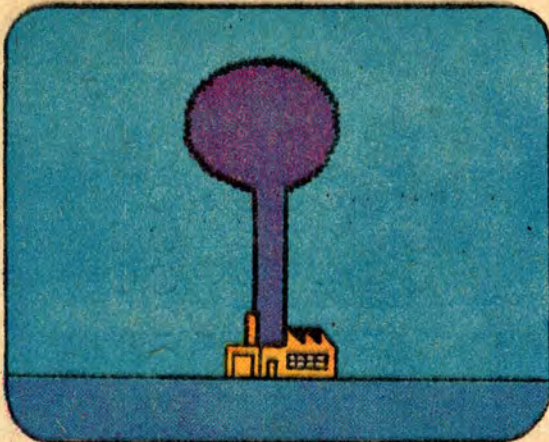


... CANNOT CONTINUE...

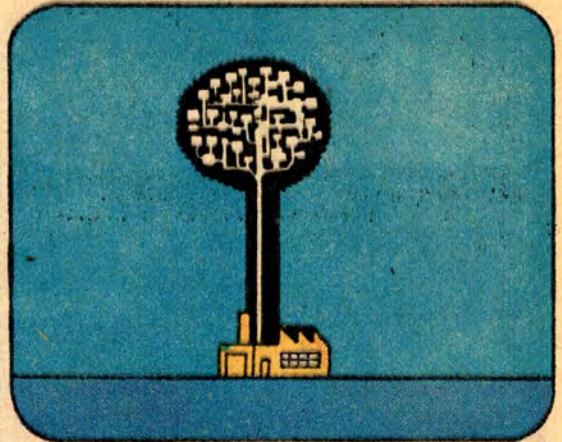


... WITHOUT STRETCHING THE LIMITS OF OUR RESOURCES.

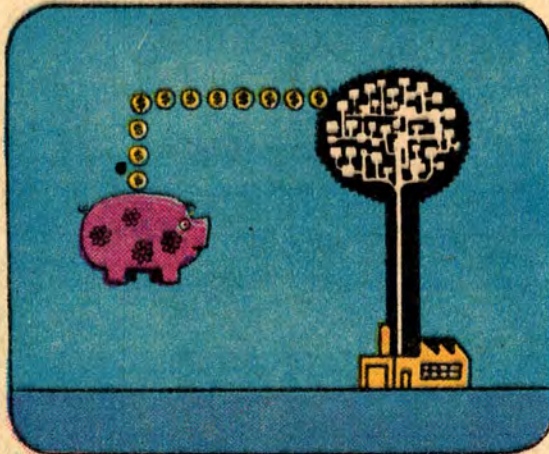




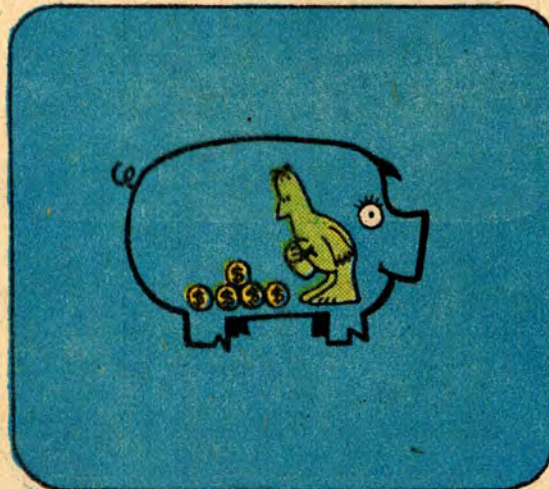
AN ELECTRIC POWER COMPANY IS LIKE A VAST, COMPLEX AND VERY EXPENSIVE TREE...



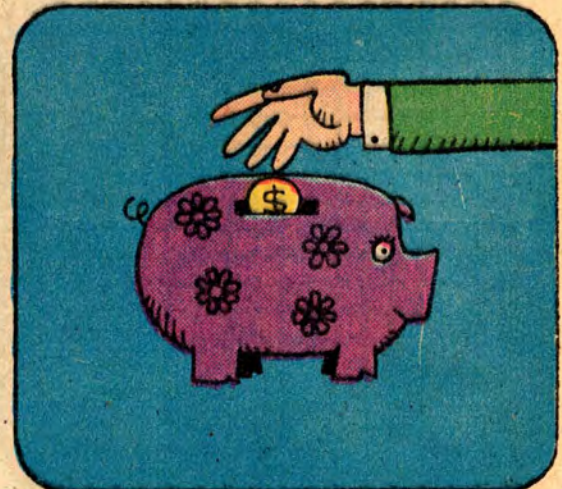
...WITH GENERATING PLANTS AT THE BASE, FROM WHICH ELECTRIC ENERGY IS SENT THROUGH TRANSMISSION AND DISTRIBUTION FACILITIES TO HOMES, STORES, FACTORIES..YOUR CUSTOMERS. ONCE YOU HAVE STARTED DELIVERING ELECTRICITY...



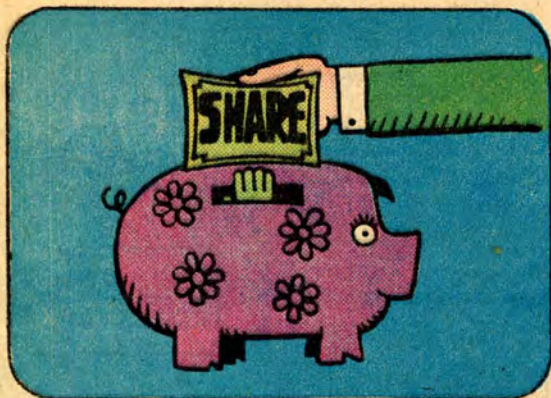
THE CUSTOMERS PAY FOR THE AMOUNTS THEY USE, WHICH BRINGS MONEY BACK INTO THE BUSINESS.



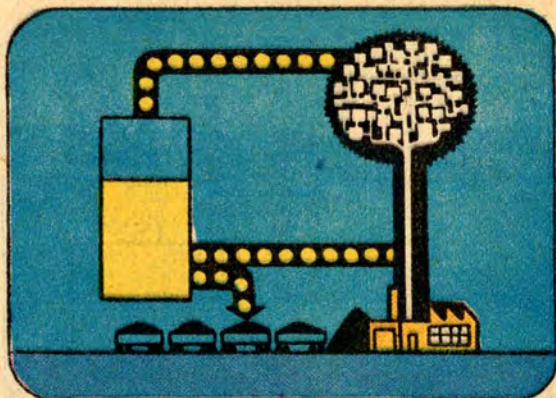
IF YOU DON'T HAVE ENOUGH MONEY TO START YOUR BUSINESS...



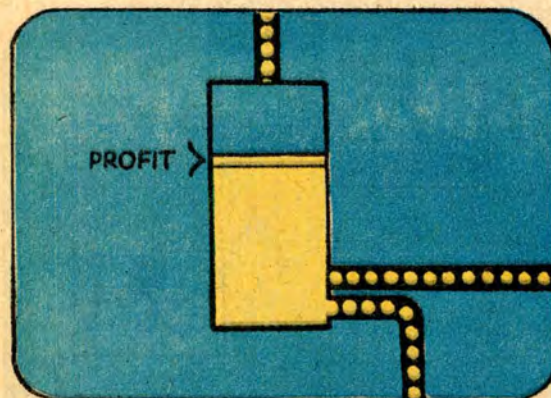
...YOU WOULD NEED HELP FROM OTHERS. YOU COULD EITHER BORROW MONEY..



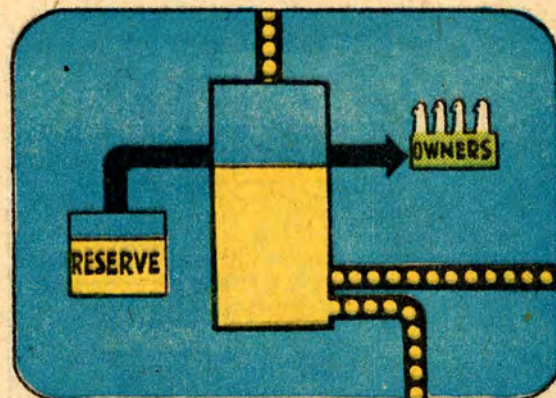
...OR SELL SHARES IN THE BUSINESS TO INVESTORS WHO BELIEVE THE BUSINESS WILL BRING THEM PROFITS. THESE INVESTORS, OR SHAREHOLDERS, BECOME OWNERS IN THE BUSINESS.



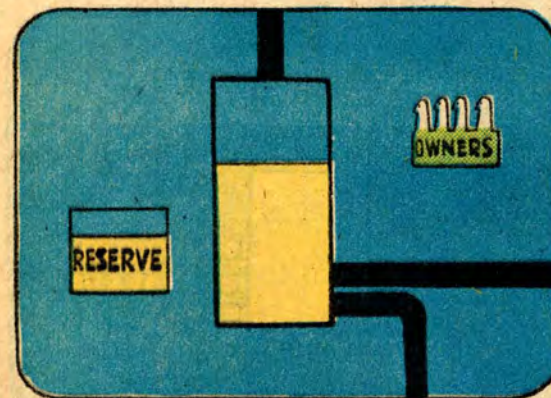
AFTER RAISING MONEY TO BUILD YOUR POWER COMPANY, YOU CONTINUE TO SPEND MONEY TO OPERATE THE PRODUCTION AND DELIVERY SYSTEM...INCLUDING BUYING THE FUEL THAT YOU CONVERT INTO THE ELECTRICITY THAT YOUR CUSTOMERS PAY YOU FOR.



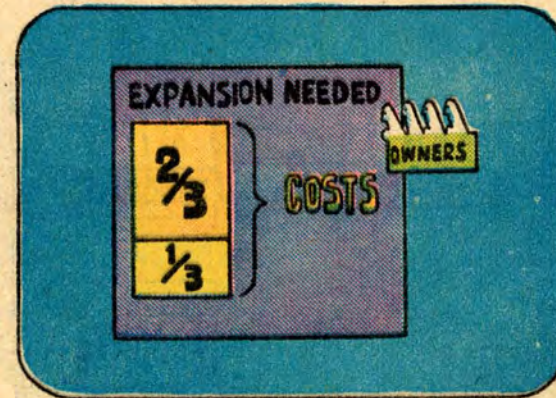
ANY SUCCESSFUL BUSINESS MUST TAKE IN MORE MONEY FROM ITS CUSTOMERS THAN IT SPENDS. WHAT IS LEFT AFTER THE OPERATING BILLS ARE PAID IS SET ASIDE FOR TAXES AND...



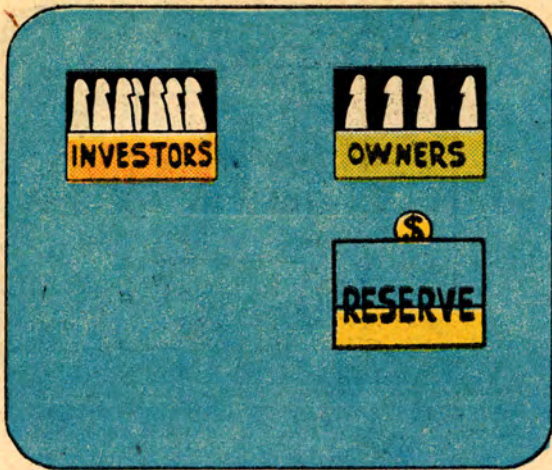
...TO GIVE YOUR SHAREHOLDERS A RETURN FOR INVESTING THE MONEY WHICH BUILT YOUR FACILITIES AND FOR FORMING A RESERVE. THIS RESERVE IS SET ASIDE TO BUILD NEEDED NEW FACILITIES AND FOR EMERGENCIES.



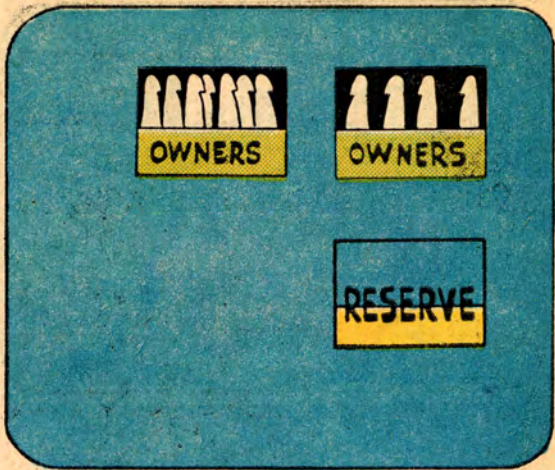
IF YOUR COMPANY NEEDED TO EXPAND, AND THERE WASN'T ENOUGH MONEY IN YOUR RESERVE TO PAY THE COST, YOU WOULD HAVE TO GO OUTSIDE YOUR BUSINESS FOR EXTRA MONEY.



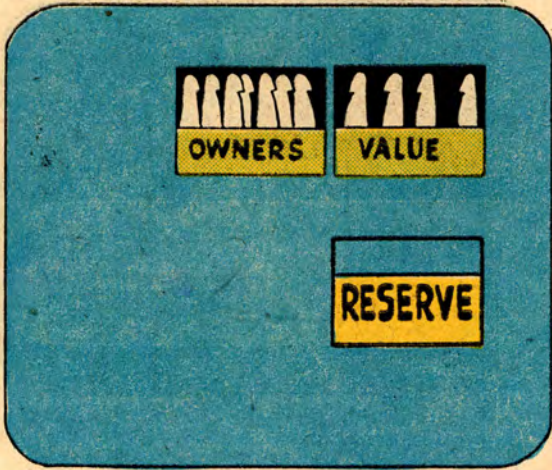
BECAUSE EXPANSION IN THE ELECTRIC POWER BUSINESS HAS BEEN SO RAPID, AND BECAUSE THE NEW FACILITIES ARE SO EXPENSIVE, MOST COMPANIES MUST SEEK OUTSIDE HELP FOR MORE THAN TWO-THIRDS OF THE MONEY THEY NEED TO BUILD NEW FACILITIES, AND MOST OF IT HAS TO BE BORROWED...AND BORROWING IS EXPENSIVE. (11)



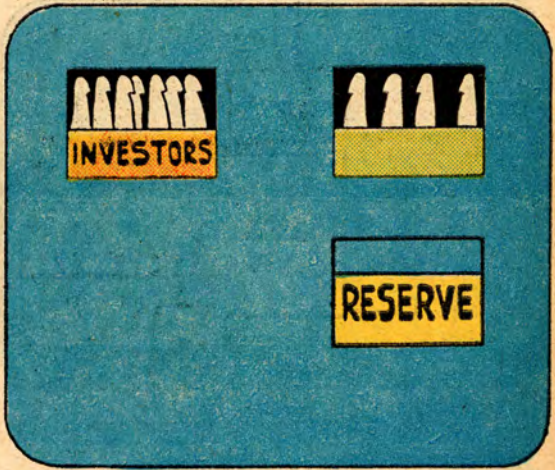
YOU COULD SELL ADDITIONAL SHARES OF STOCK AND USE THAT MONEY FOR EXPANSION. BUT ALL NEW SHAREHOLDERS...



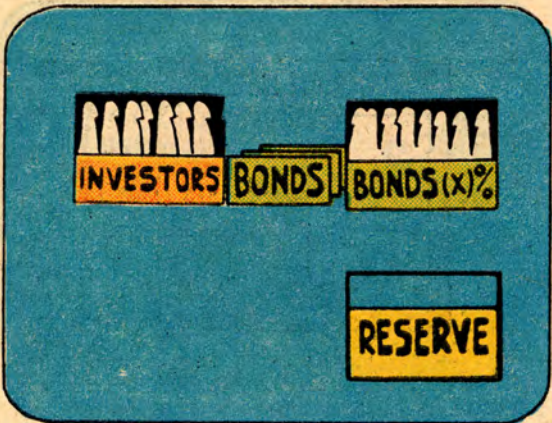
...BECOME ADDITIONAL OWNERS OF THE BUSINESS, AND ARE ENTITLED TO A SHARE OF THE PROFITS.



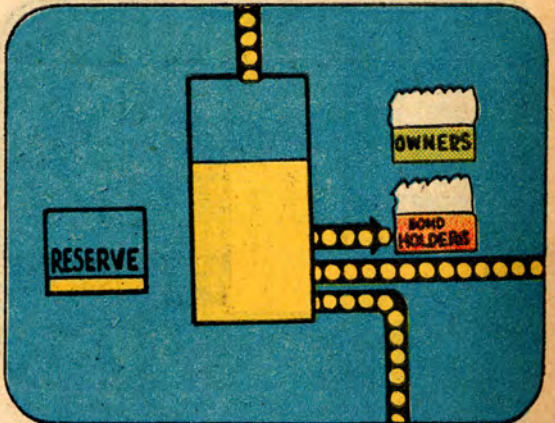
SELLING TOO MANY OWNERSHIP SHARES CAN CAUSE PROBLEMS SUCH AS REDUCING THE VALUE OF OWNERSHIP...



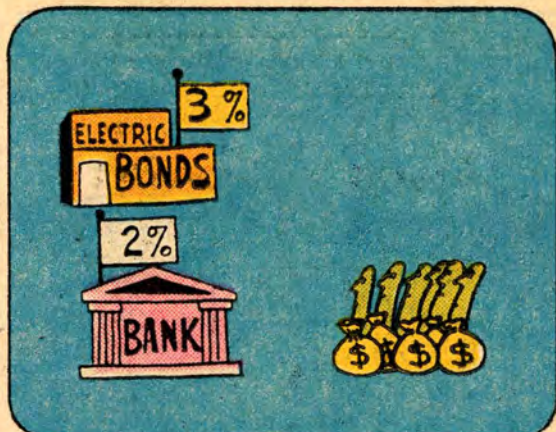
...THEREFORE, THE MAIN WAY POWER COMPANIES HAVE FINANCED EXPANSION IS BY SELLING BONDS.



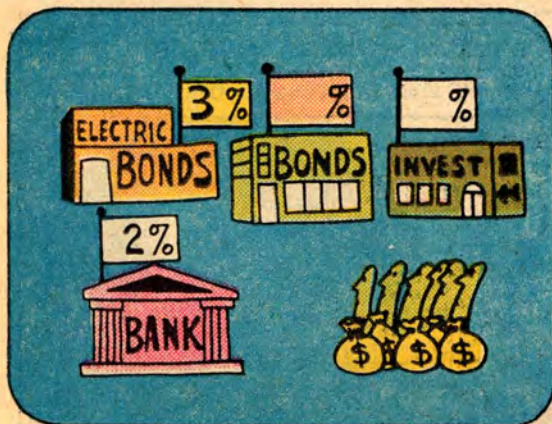
THIS IS A WAY OF RENTING MONEY TO BUILD NEW FACILITIES. THE BONDHOLDERS RENT THEIR MONEY FOR A SPECIFIC PRICE..THE INTEREST RATE..FOR A SPECIFIC NUMBER OF YEARS, PERHAPS 20 OR MORE.



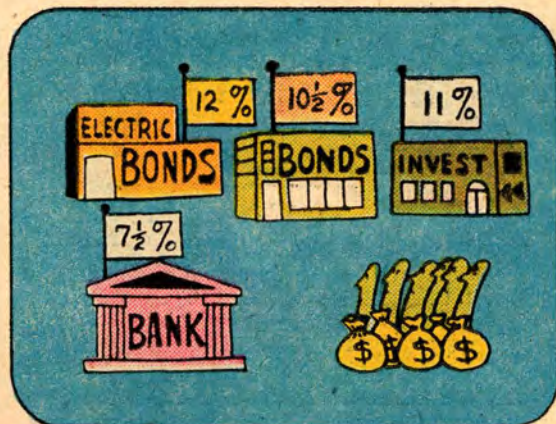
THE BONDHOLDERS MUST BE PAID THEIR RENTAL PRICE, WHETHER THERE IS A PROFIT OR NOT. AND THEIR ORIGINAL INVESTMENT MUST BE PAID BACK WHEN IT IS DUE.



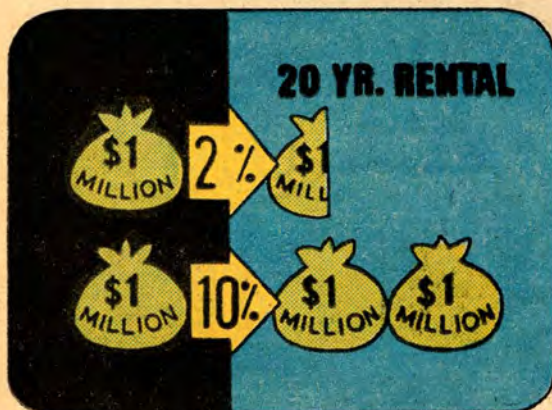
WHEN BANKS WERE PAYING 2% ON SAVINGS, INVESTORS COULD GET MORE BY BUYING UTILITY BONDS WHICH PAID 2½ OR 3%. BUT AS OUR COUNTRY WENT ALL OUT FOR GROWTH...



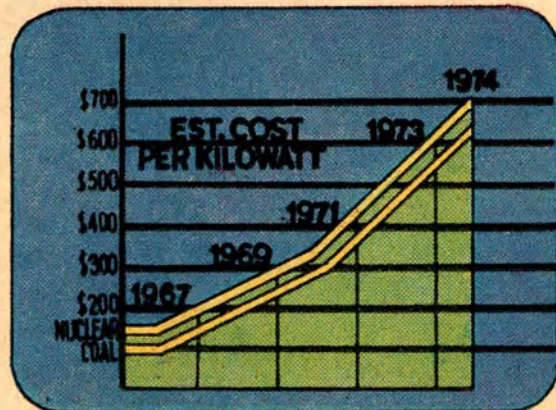
...MORE AND MORE FUNDS WERE NEEDED BY ALL SORTS OF BUSINESSES, AND IT BECAME MORE AND MORE EXPENSIVE TO GET MONEY FOR EXPANSION AS INTEREST AND RENTAL RATES WENT UP AND UP.



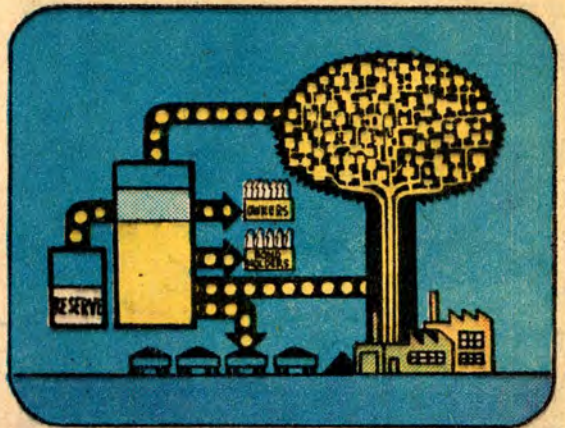
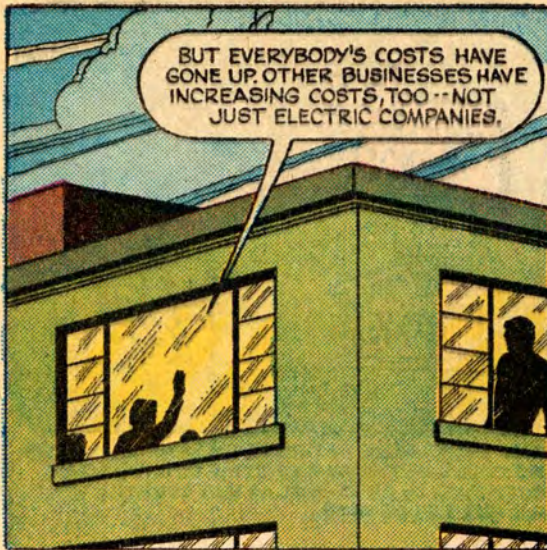
AS THIS CONTINUED AND THE "MONEY CRUNCH" DEVELOPED, RENTING MONEY TO BUILD NEW FACILITIES BECAME A PARTICULARLY SERIOUS PROBLEM FOR THE ELECTRIC POWER COMPANIES.



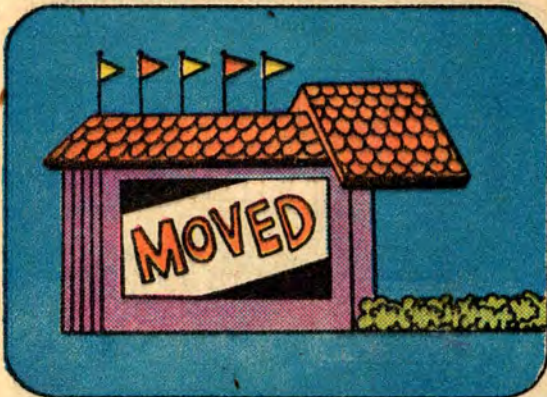
WHEN PEOPLE WERE GLAD TO RENT THEIR MONEY AT 2½ OR 3%, THE 20-YEAR RENTAL ON A MILLION DOLLARS WAS ABOUT \$500,000. WHEN INTEREST RATES WENT UP PAST 10%, THIS RENTAL ROSE TO OVER \$2,000,000.



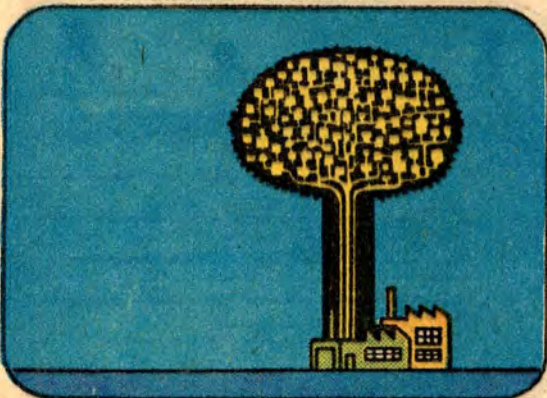
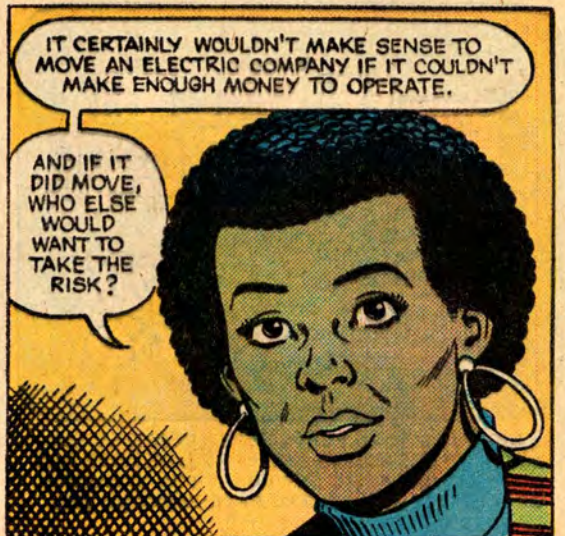
THE RISING COST OF RENTAL MONEY COMBINED WITH RISING CONSTRUCTION COSTS HAVE BEEN INCREASING THE EXPENSE OF EACH NEW KILOWATT OF GENERATING CAPACITY AT AN ALARMING RATE.



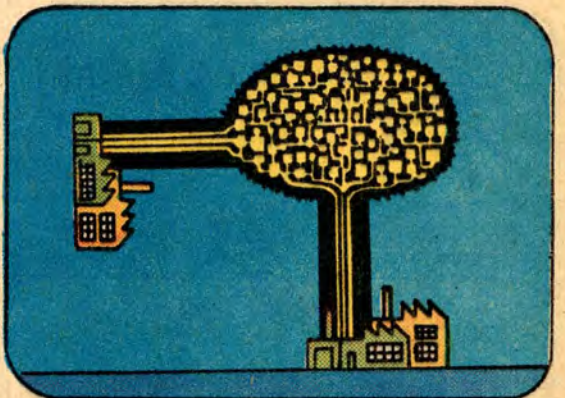
IN MOST BUSINESSES, WHEN THE COSTS GO UP THE OWNERS CAN RAISE THE PRICES THEY CHARGE IN ORDER TO MAINTAIN PROFITS AND THE RESERVE NEEDED FOR EXPANSION...



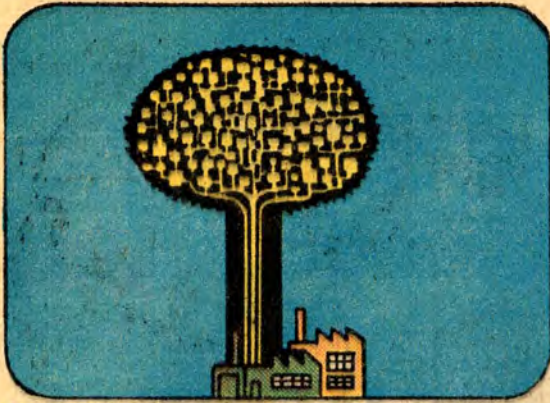
...SUBJECT OF COURSE TO THE FORCES OF SUPPLY AND DEMAND. THE OWNERS ARE FREE TO ADJUST PRICES UP OR DOWN AND IF THEY WANT, CAN CHANGE PRODUCTS OR MOVE TO A MORE PROFITABLE LOCATION.



ELECTRIC COMPANIES DON'T HAVE THE SAME FREEDOMS THAT OTHER BUSINESSES HAVE. THE COMPLEX AND COSTLY FACILITIES ARE SUITABLE FOR ONE PURPOSE. THEY CANNOT BE MOVED OR ADAPTED TO OTHER PRODUCTS.



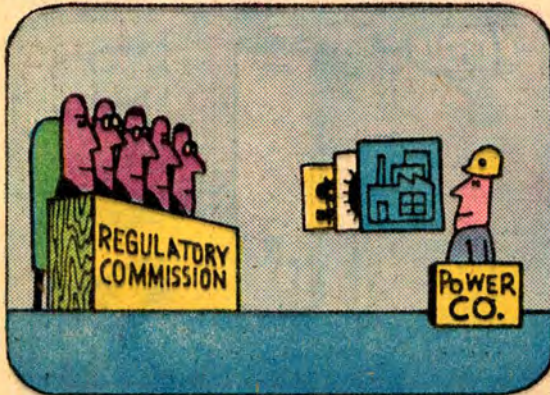
IT ISN'T PRACTICAL TO HAVE TWO OR MORE ELECTRIC NETWORKS COMPETING IN THE SAME COMMUNITY. DUPLICATING FACILITIES WOULD BE SO COSTLY NO ONE WOULD RISK BEING IN THE ELECTRIC BUSINESS.



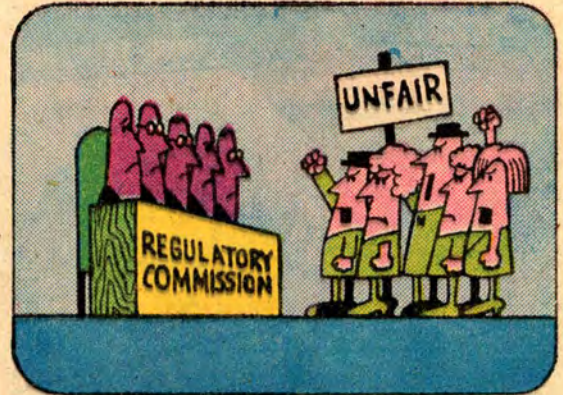
SO AN ELECTRIC COMPANY IS GIVEN AN EXCLUSIVE TERRITORY IN WHICH IT IS OBLIGATED TO SERVE ALL THOSE WHO WISH TO BUY ELECTRIC ENERGY..IT MUST PROVIDE ALL THE ELECTRICITY ITS CUSTOMERS REQUIRE.



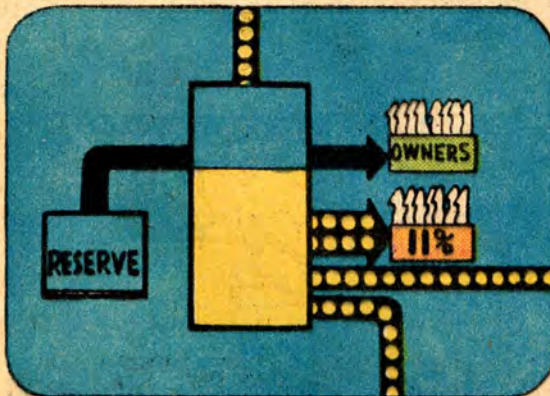
AN ELECTRIC COMPANY LIKEWISE IS NOT FREE TO SET ITS OWN PRICES. AS A SUBSTITUTE FOR THE PRICE-STABILIZING FORCES OF COMPETITION, THE PRICE IS REGULATED BY A PUBLIC SERVICE COMMISSION WHICH REPRESENTS THE CUSTOMERS.



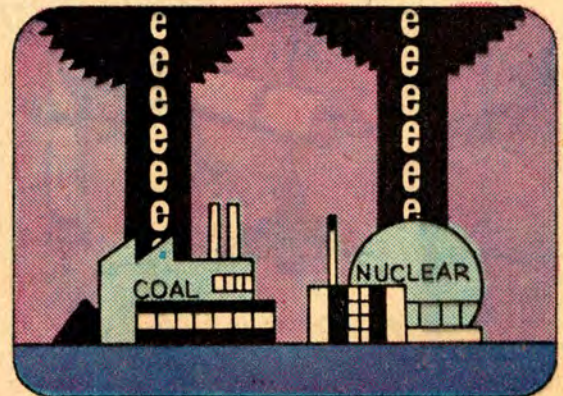
THE POWER COMPANY MUST PRESENT ALL INFORMATION ON COSTS, PROBLEMS AND DEVELOPMENTS TO THE COMMISSION, WHICH IS THEN SUPPOSED TO SET A PRICE THAT IS MOST LIKELY TO PAY THE OWNERS A PROFIT CLOSE TO THAT OF A TYPICAL COMPETITIVE BUSINESS.



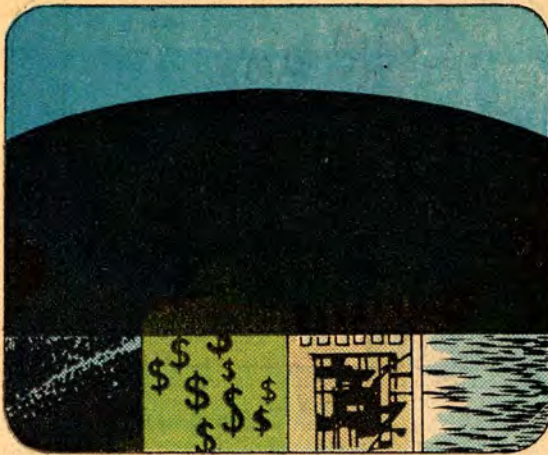
OF COURSE THE COMMISSION IS WELL AWARE THAT ANY PRICE INCREASE...NO MATTER HOW WELL JUSTIFIED...IS NOT LIKELY TO MAKE CUSTOMERS HAPPY.



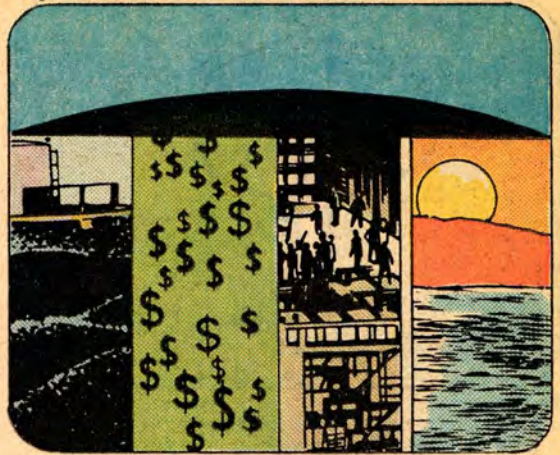
UNFORTUNATELY, WHEN PRICES ARE NOT HIGH ENOUGH, PROFITS AND RESERVES DECLINE STILL FURTHER. THIS MEANS THAT MORE MONEY MUST BE RENTED...ADDING FURTHER TO COSTS. THIS VICIOUS CYCLE CAN ONLY BE AVOIDED IF PRICES ARE REALISTICALLY RELATED TO COSTS.



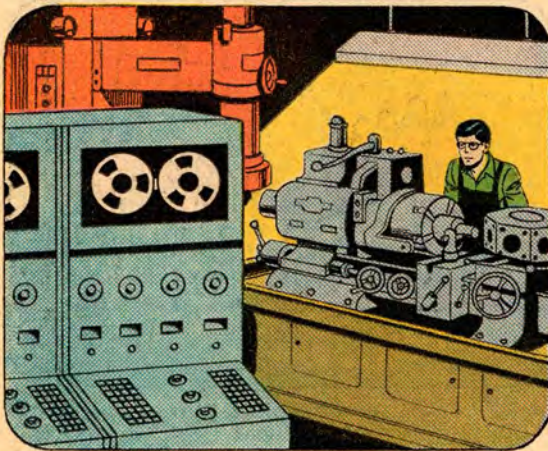
TODAY, THOSE DEVELOPING TECHNOLOGIES MENTIONED EARLIER ARE OF LITTLE HELP...SO IT IS ONLY SENSIBLE WHEN SPENDING HUNDREDS OF MILLIONS OF DOLLARS ON THE FACILITIES TO GENERATE THE POWER WE NEED TO PLACE THE GREATEST RELIANCE ON PROVEN TECHNOLOGY.



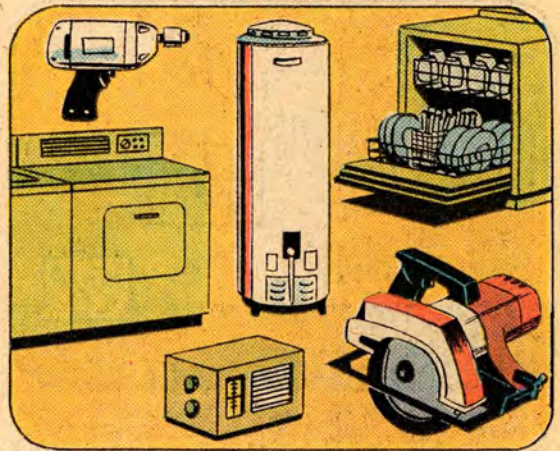
WHILE THE COSTS OF CONSTRUCTION, RENTING MONEY, FUELS AND ENVIRONMENTAL PROTECTION ARE RISING...



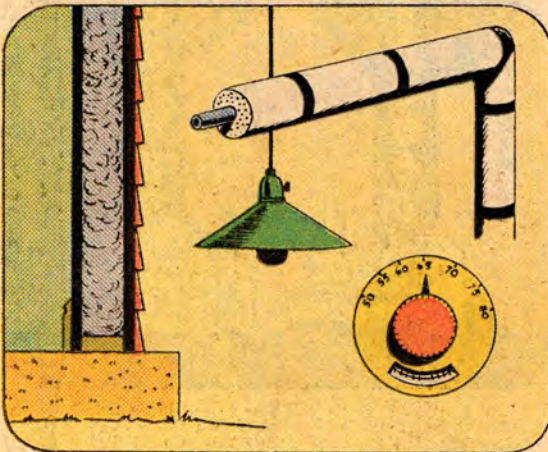
...OUR GROWING DEMANDS FOR MORE AND MORE ELECTRIC ENERGY ARE PUTTING PRESSURES ON OUR RESOURCES WHICH WILL INEVITABLY REACH THEIR LIMIT.



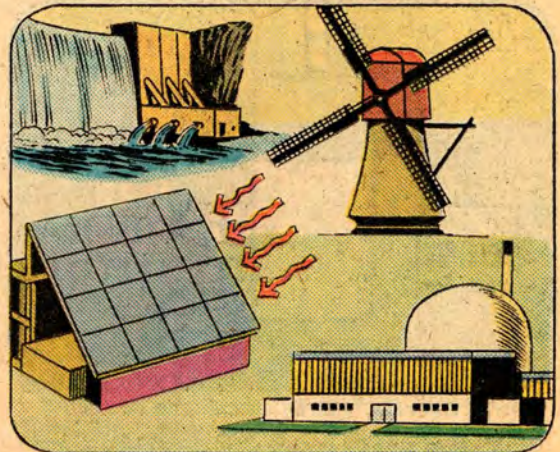
YET TO REALISTICALLY CONSIDER OUR FUTURE, WE CANNOT SUDDENLY TURN OFF PROGRESS. OUR INDUSTRIAL SOCIETY DEPENDS ON ELECTRICITY.



GROWING USE OF ELECTRICITY IS AN ESSENTIAL INGREDIENT OF OUR LIVING STANDARD AND OUR JOBS. STOPPING GROWTH ENTIRELY WOULD INVITE ECONOMIC DISASTER.



THOUGH WE WILL NEED MORE ELECTRICITY TOMORROW THAN IS NEEDED TODAY, WE CAN PLAN BETTER, BUILD BETTER, INSULATE BETTER...LEARN TO USE ENERGY WISELY, WITHOUT WASTE.



AND WE CAN PUT HIGH PRIORITY ON RESEARCH AND DEVELOPING NEW AND BETTER WAYS TO MAKE ELECTRICITY THAT WILL REDUCE THE PRESSURES ON OUR ENVIRONMENT.

THE END

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