

BEYOND VS

A GRAPHIC NOVEL SERIES FROM BEYOND CAD INC



SOLVING INFRASTRUCTURE
CHALLENGES FOR A BETTER
TOMORROW

Thank you for taking the time to read "Beyond VS," a groundbreaking graphic novel series that aims to do more than just entertain—it aspires to enlighten. We hope that this series can serve as a vibrant canvas to explore, discuss, and appreciate the engineering marvels that make our modern lives possible.

"Beyond VS" is a labor of love that combines our decades of experience as licensed professional engineers with cutting-edge AI tools. The result is a collection of beautifully illustrated graphic novels that delve into a myriad of topics related to infrastructure—urban sprawl, distracted driving, city beautification, and so much more.

At the heart of each issue is Bey, a curious and relatable character who embarks on adventures to understand the world of infrastructure. Guided by her AI companion, OND, Bey navigates through the intricacies of engineering marvels, policy implications, and societal needs. These discussions ultimately lead to Bey finding her own role in solving the infrastructure challenges of today and tomorrow. Each issue is a journey into a different facet of infrastructure, rendered in a unique art style (courtesy of MidJourney, Illustrator and Photoshop with some credit to Chat GPT) that captures the essence of the subject matter.

Whether you're a seasoned professional in the field of engineering, a concerned citizen, or someone simply intrigued by how the world around you works, "Beyond VS" has something for you. Our aim is to inspire, educate, and entertain a wide audience, from passionate professionals to lay members of the community and everyone in between.

The power of storytelling is universal, and the medium of graphic novels allows us to convey complex topics in an engaging and accessible manner. The visual elements act as a catalyst for understanding, breaking down barriers that technical jargon often erects. Through Bey's eyes, we hope to make the world of infrastructure relatable and interesting to all.

As you turn the pages of this series, we invite you to open your mind to the wonders of engineering and technology. Let's venture beyond the visible and explore the intricate web of systems and structures that sustain our lives.

Thank you for joining us on this exciting journey. We hope that "Beyond VS" not only captivates your imagination but also enriches your understanding of the world we build and inhabit.

Happy reading!

Sincerely,

The Beyond CAD Inc Team

Sam Lytle, PE
Brian Sroufe, PE

Read more at www.beyondillustrated.com

This series is brought to you by our drag and drop street design and visualization software, Beyond Typical. Learn how you can create streets in minutes in fully animated 3D and schedule a demo by visiting www.beyondcad.com/beyondtypicals



BEYOND VS INFRASTRUCTURE DECAY



#1



DOWNLOADING
CODE TO GLASSES...



THREE YEARS OF
WORK AND IT ALL
COMES DOWN
TO THIS...

HERE GOES
NOTHING.

BEEP... BEEP...



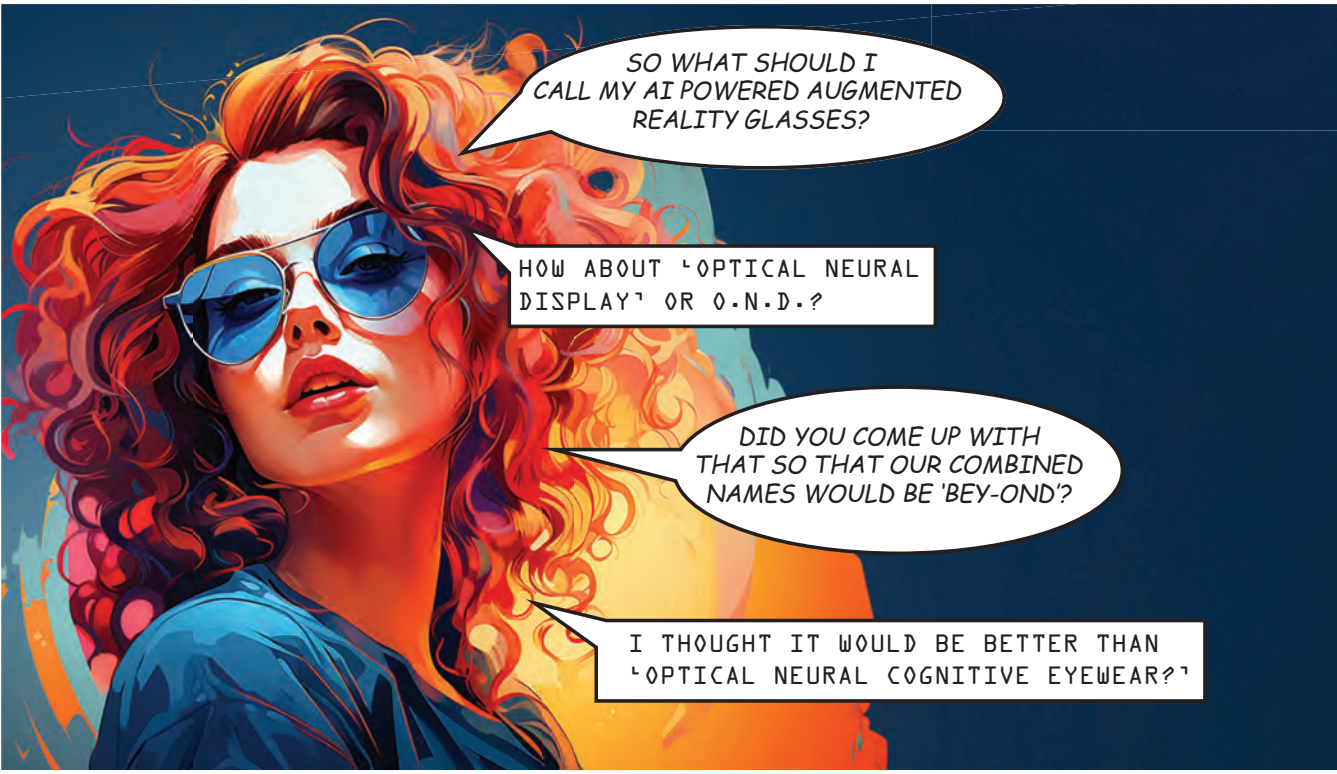
HELLO BEY. WHY DON'T
YOU PUT ME ON?



IT WORKED!



OH YEAH!!



SO WHAT SHOULD I
CALL MY AI POWERED AUGMENTED
REALITY GLASSES?

HOW ABOUT 'OPTICAL NEURAL
DISPLAY' OR O-N-D-?

DID YOU COME UP WITH
THAT SO THAT OUR COMBINED
NAMES WOULD BE 'BEY-OND'?

I THOUGHT IT WOULD BE BETTER THAN
'OPTICAL NEURAL COGNITIVE EYEWEAR?'



I SEE I SPENT
YEARS MAKING A
SUPER-INTELLIGENT
PAIR OF SUNGLASSES
THAT TELLS DAD
JOKES...

NICE,
'OND'




SO WHY DID YOU CREATE ME, BEY?

I WAS KIND OF HOPING YOU COULD TURN ME INTO A SUPER HERO.

AS AN AI AUGMENTED DISPLAY, I CAN SHOW YOU MANY DANGERS HIDDEN IN PLAIN SIGHT AND EXPLAIN THEM TO YOU IN DETAIL.

VERY COOL. SO SHOW ME A DANGER I HAVEN'T SEE BEFORE.



WELL, FOR EXAMPLE, WE LIVE IN AN AMAZING WORLD THAT MAKES IT POSSIBLE TO LIVE VIBRANT LIVES. HOWEVER, BENEATH WHAT YOU MIGHT SEE, MUCH OF OUR INFRASTRUCTURE IS CRUMBLING RIGHT BEFORE OUR EYES.



MUCH OF THIS DETERIORATION IS INVISIBLE TO THE NAKED EYE

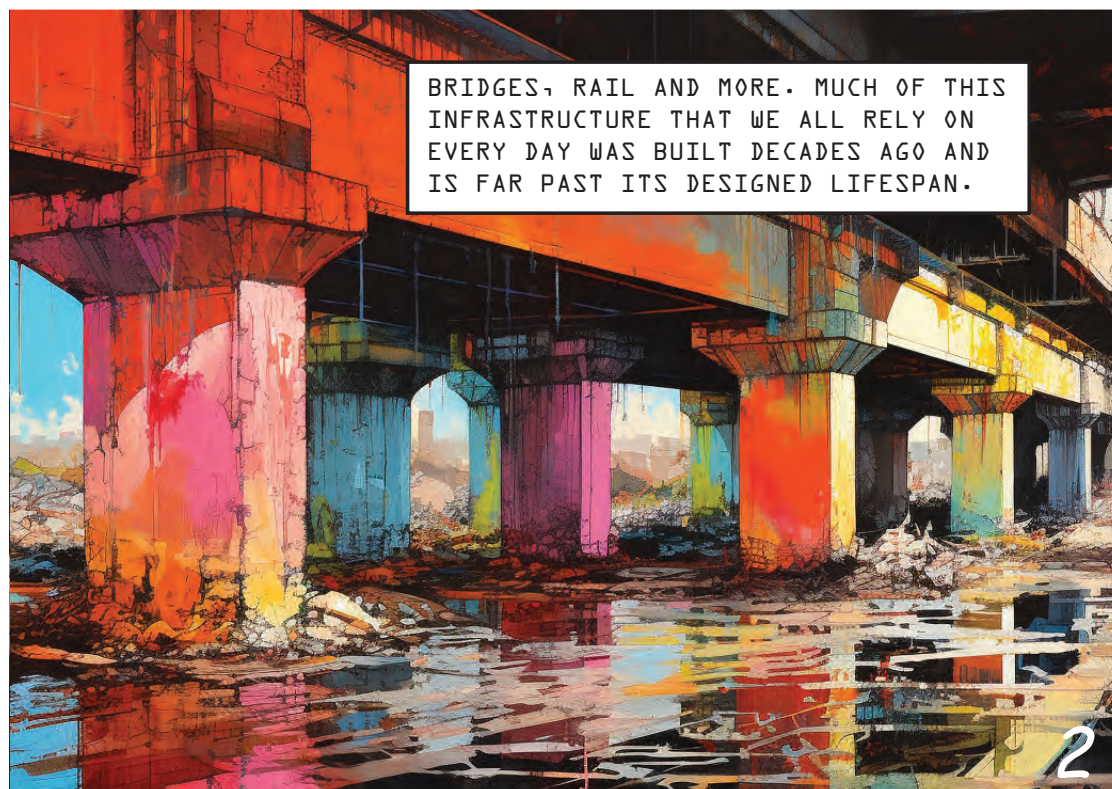


OUR BUILDINGS, ROADS AND PUBLIC UTILITIES...

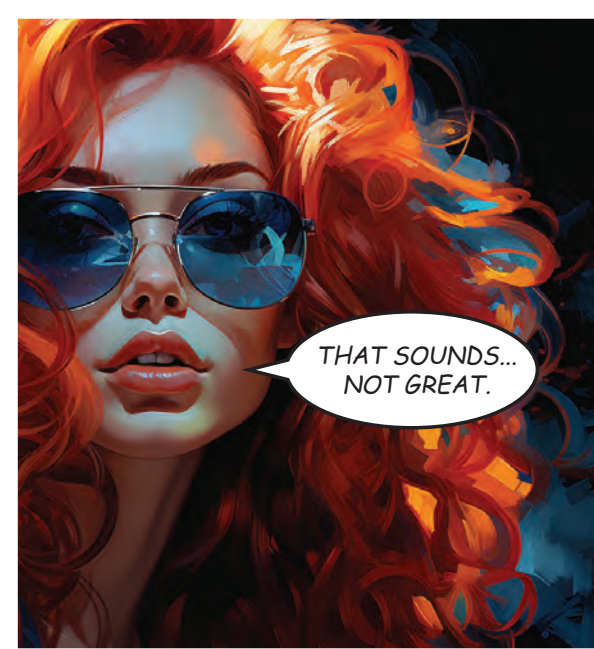
BUT LOOK MORE CLOSELY AND IT IS ALL AROUND YOU.



OUR AIRPORTS...



BRIDGES, RAIL AND MORE. MUCH OF THIS INFRASTRUCTURE THAT WE ALL RELY ON EVERY DAY WAS BUILT DECADES AGO AND IS FAR PAST ITS DESIGNED LIFESPAN.

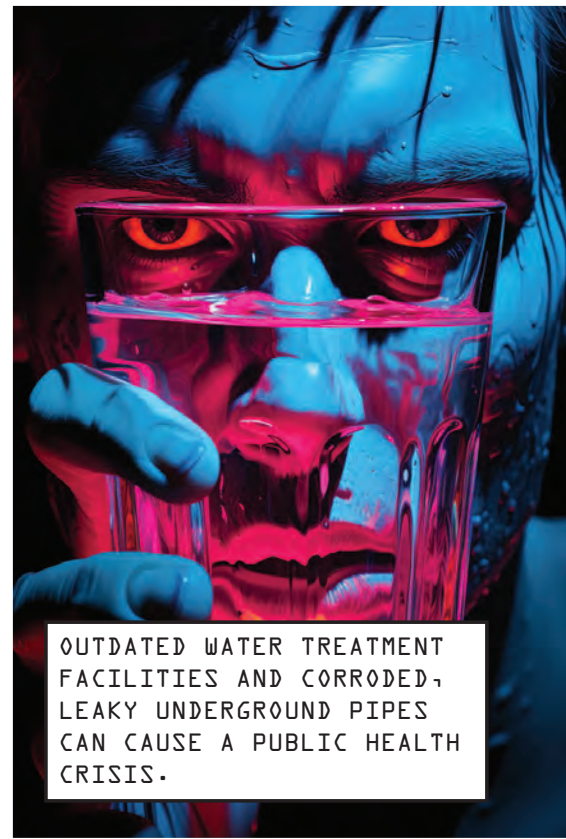


THAT SOUNDS...
NOT GREAT.



INDEED. CONSIDER PUBLIC SAFETY. INFRASTRUCTURE IN DISREPAIR SUCH AS HIGHWAYS, RAILROADS AND BRIDGES CAN LEAD TO FATAL ACCIDENTS LIKE CRASHES, DERAILMENTS AND COLLAPSES.

A RECENT REPORT ESTIMATED THAT OVER 47,000 BRIDGES ARE DEFICIENT IN THE U.S. ALONE.



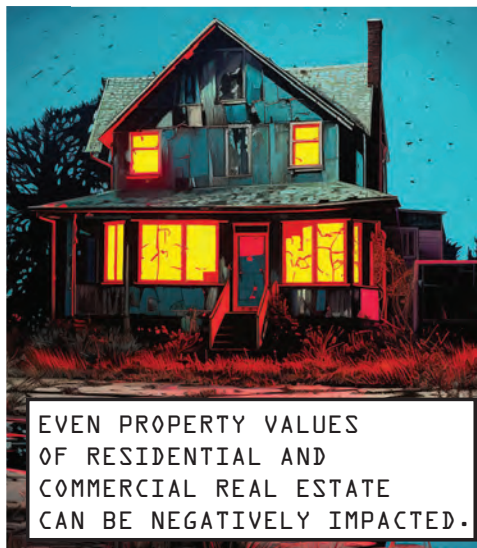
OUTDATED WATER TREATMENT FACILITIES AND CORRODED, LEAKY UNDERGROUND PIPES CAN CAUSE A PUBLIC HEALTH CRISIS.

THERE ARE ALSO OTHER IMPACTS. TRANSPORT ALLOWS PEOPLE AND GOODS TO MOVE EFFICIENTLY AND PREDICTABLY. IF INFRASTRUCTURE FAILS, SUPPLY CHAIN INTERRUPTIONS CAN CAUSE SIGNIFICANT ECONOMIC DISRUPTION.



AND THEN THERE ARE SECOND AND THIRD ORDER EFFECTS LIKE POOR ROAD CONDITIONS CAUSING DAMAGE TO VEHICLES...

...OR ENVIRONMENTAL DAMAGE SUCH AS OIL SPILLS FROM AGING PIPELINES, OR INCREASED GREENHOUSE GAS EMISSIONS FROM OUTDATED ENERGY SYSTEMS.



EVEN PROPERTY VALUES OF RESIDENTIAL AND COMMERCIAL REAL ESTATE CAN BE NEGATIVELY IMPACTED.



OKAY, OKAY! I GET IT. INFRASTRUCTURE DECAY IS KIND OF A BIG DEAL.



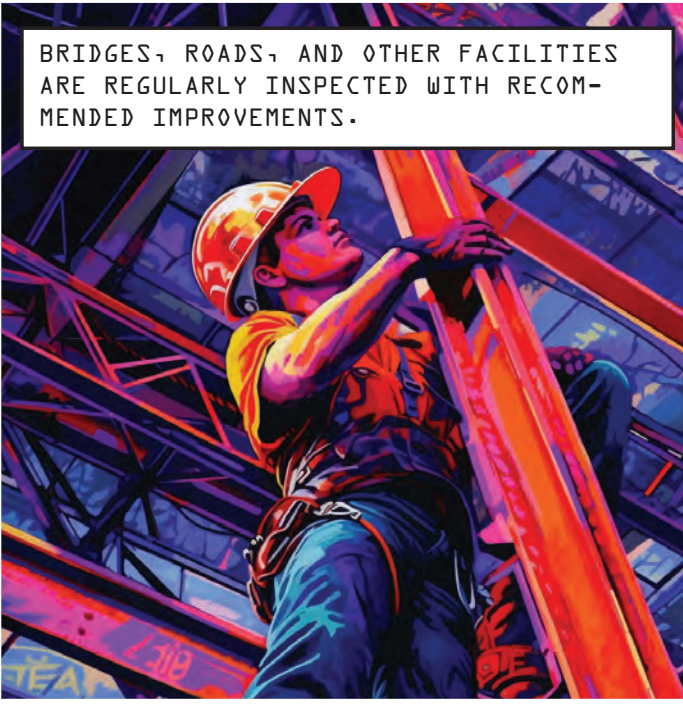
EXPERTS AGREE THAT THESE IMPROVEMENTS WILL TAKE TRILLIONS OF DOLLARS OF INFRASTRUCTURE INVESTMENT.



SO WHAT DO WE DO? IT SEEMS LIKE THIS WILL ALL JUST KEEP GETTING WORSE IF SOMETHING DOESN'T CHANGE.



TO BE CLEAR, MUCH WORK IS ALREADY UNDERWAY. MANY OF THE SMARTEST ENGINEERS, DEVOTED PUBLIC OFFICIALS AND ENGAGED CITIZENS ARE DEDICATING THEIR CAREERS AND LIVES TO IMPROVING AND REBUILDING OUR INFRASTRUCTURE.



BRIDGES, ROADS, AND OTHER FACILITIES ARE REGULARLY INSPECTED WITH RECOMMENDED IMPROVEMENTS.



PUBLIC-PRIVATE PARTNERSHIPS ARE HELPING TO FUND IMPORTANT PROJECTS.



CONGRESS HAS ALREADY PASSED SEVERAL FUNDING BILLS AIMED AT INFRASTRUCTURE.



MATERIAL SCIENCE AND OTHER ADVANCEMENTS WILL MAKE ASPHALT PAVEMENT, CONCRETE AND OTHER MATERIALS LAST LONGER AND REDUCE CARBON FOOTPRINT.



AI ADVANCES WILL MAKE DESIGN, CONSTRUCTION AND MAINTENANCE OF INFRASTRUCTURE ELEMENTS BETTER AND MORE EFFICIENT.

AND REPAIRS ARE ALWAYS UNDERWAY, OFTEN PRIORITIZED BY THE MOST PRESSING NEEDS.

I'M FEELING A LITTLE BETTER NOW. BUT WHAT MORE CAN WE DO? WHAT COULD AN AVERAGE CITIZEN DO TO MAKE A DIFFERENCE?

PERHAPS THE BEST THING YOU CAN DO IS ATTEND AND PARTICIPATE IN PUBLIC MEETINGS AND SPECIAL INTEREST GROUPS. THIS WILL MAKE SURE YOUR VOICE IS HEARD BY THOSE OVERSEEING AND PRIORITIZING THESE INFRASTRUCTURE IMPROVEMENTS.

YOU CAN EDUCATE YOURSELF AND OTHERS...

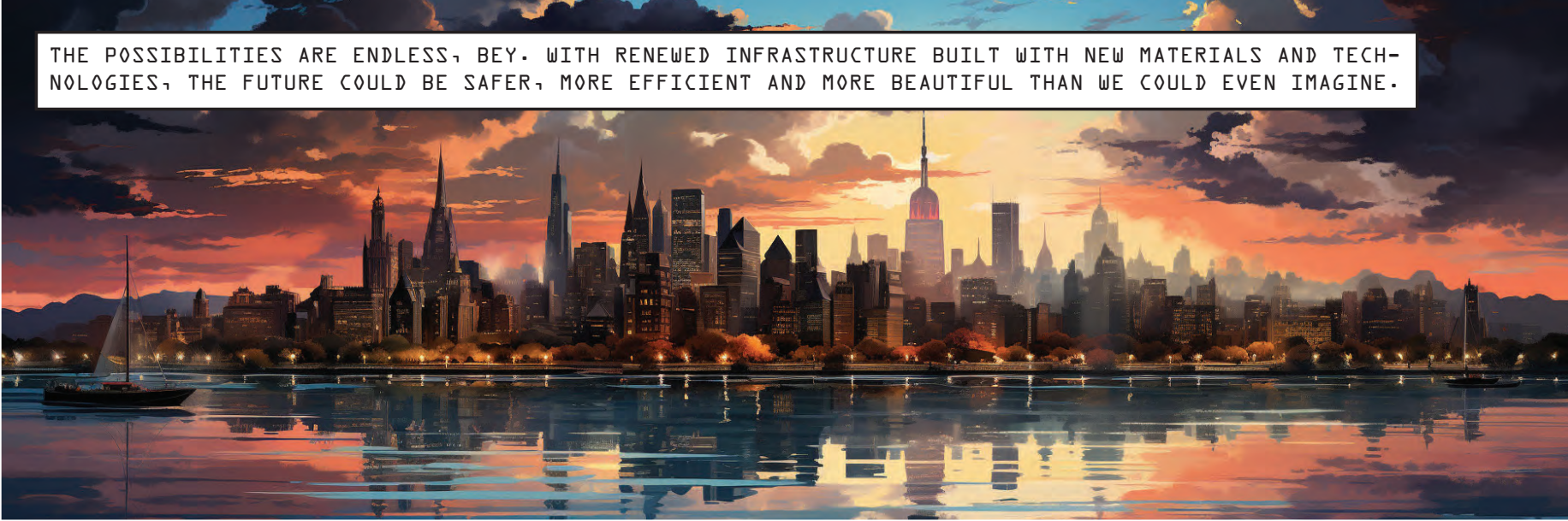
...AND YOU CAN CONTACT YOUR GOVERNMENT REPRESENTATIVES TO EMPHASIZE THESE ISSUES AND ASK HOW YOU CAN HELP.

YOU CAN ALSO PROMOTE AND USE PUBLIC TRANSPORTATION TO EASE BURDENS ON LESS EFFICIENT FORMS OF TRANSPORTATION LIKE ROADS...

AND SUPPORT LOCAL BUSINESSES TO CONTRIBUTE TO THE ECONOMIC HEALTH OF YOUR COMMUNITY.



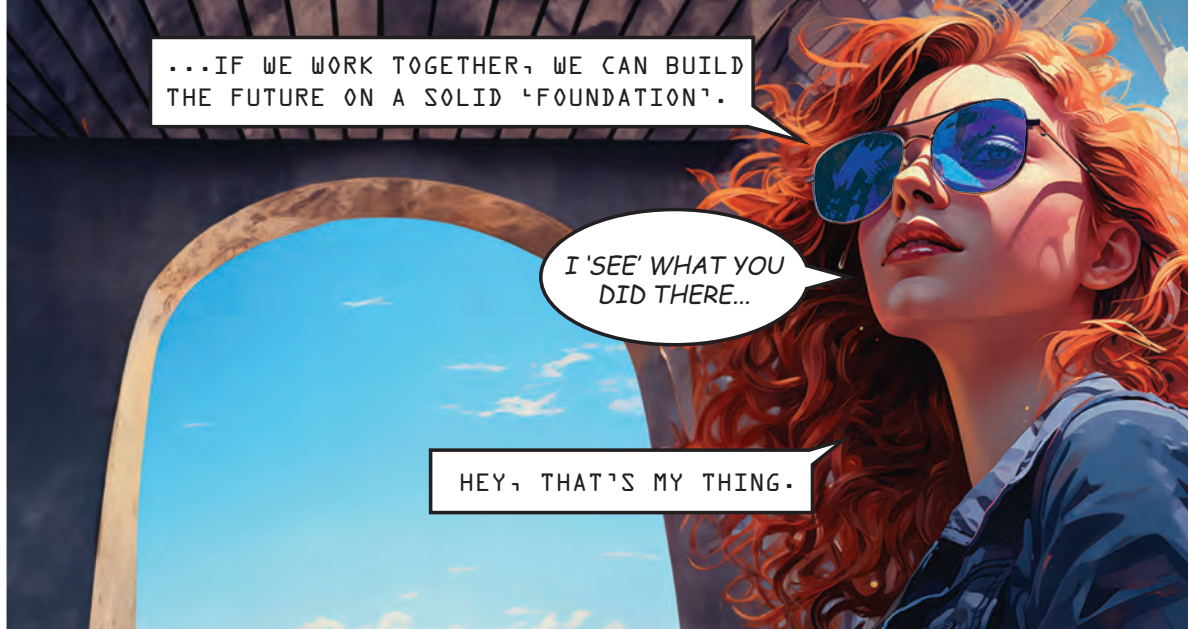
OKAY OND, I'M IN. SO WHAT HAPPENS WHEN WE TURN THINGS AROUND? ASSUMING WE DON'T DIE IN A FIERY BRIDGE COLLAPSE...



THE POSSIBILITIES ARE ENDLESS, BEY. WITH RENEWED INFRASTRUCTURE BUILT WITH NEW MATERIALS AND TECHNOLOGIES, THE FUTURE COULD BE SAFER, MORE EFFICIENT AND MORE BEAUTIFUL THAN WE COULD EVEN IMAGINE.



IMAGINE WHAT INNOVATION CAN BRING 'DOWN THE ROAD'? ENERGY HARVESTING ROADS, SELF-HEALING CONCRETE, FLYING CARS...



...IF WE WORK TOGETHER, WE CAN BUILD THE FUTURE ON A SOLID 'FOUNDATION'.

I 'SEE' WHAT YOU DID THERE...

HEY, THAT'S MY THING.



LET'S BUILD AN WORLD THAT IS 'BEYOND' AMAZING.

I'M GOING TO RE-PROGRAM YOU TO BE LESS CRINGE.


BEYOND VS IS A PRODUCTION OF BEYOND CAD INC

WRITTEN BY: SAM LYTLE, PE
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CHAT GPT

LAYOUT AND DESIGN: SAM LYTLE, PE

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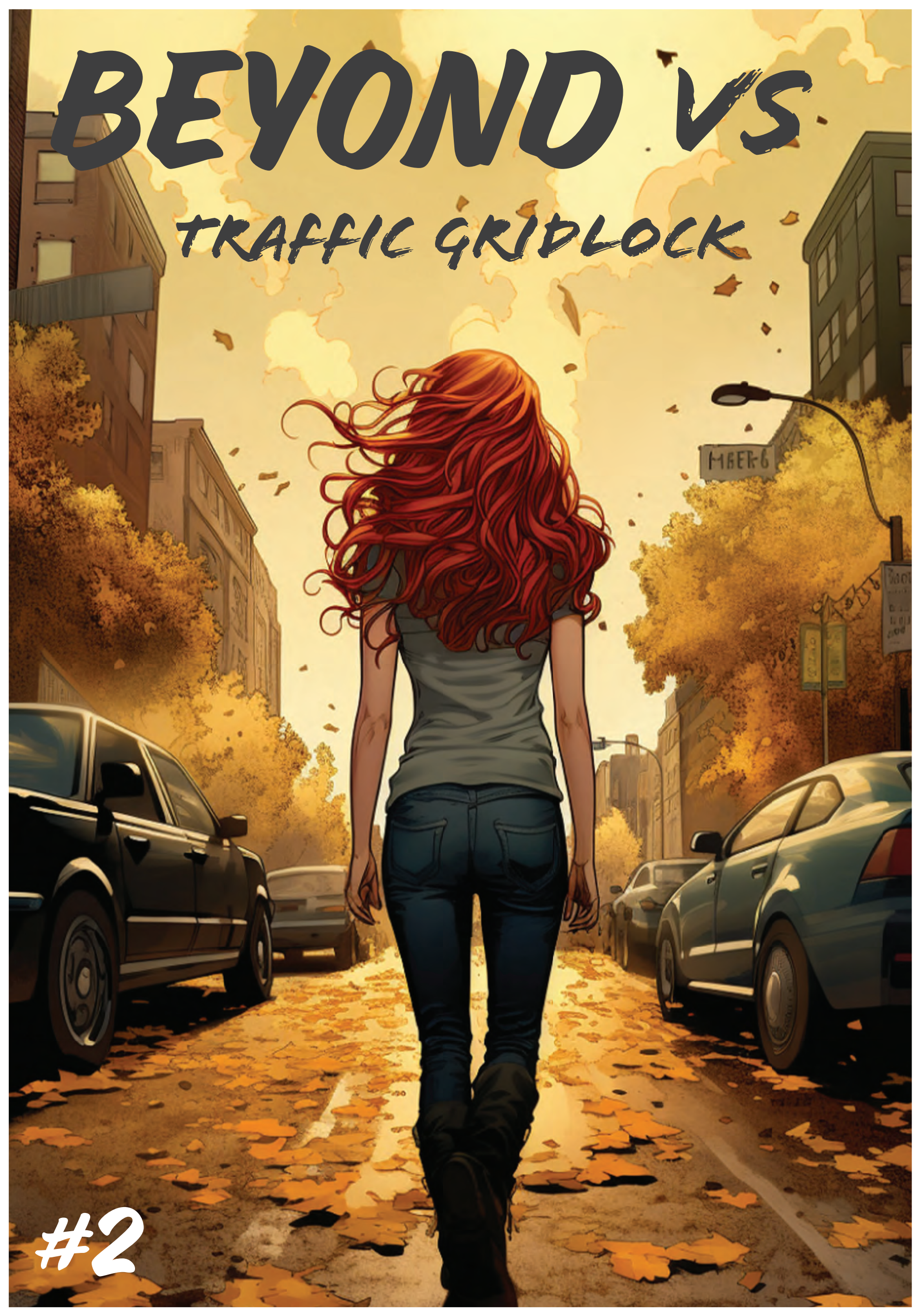


BEYONDTYPICALS 


6

BEYOND VS

TRAFFIC GRIDLOCK



#2



ALRIGHT, OND, LET'S SEE WHAT'S GOING ON IN OUR WORLD TODAY. IT LOOKS SO BEAUTIFUL OUT THERE, BUT I WANT YOU TO SHOW ME WHAT'S REALLY GOING ON.

SURE, BEY. HAVE YOU EVER BEEN STUCK IN TRAFFIC?

OF COURSE! IT'S BASICALLY THE WORST AND DRIVES ME CRAZY.



THIS ISN'T JUST A FRUSTRATING EXPERIENCE FOR DRIVERS, TRAFFIC GRIDLOCK IS A MASSIVE PROBLEM THAT AFFECTS THE ENTIRE WORLD, EVEN BEYOND YOUR MENTAL HEALTH.

THERE ARE MANY NEGATIVE IMPACTS OF GRIDLOCK, INCLUDING POOR AIR QUALITY FROM IDLE VEHICLES WAITING IN TRAFFIC. BILLIONS OF GALLONS OF FUEL ARE WASTED EVERY YEAR FROM VEHICLES WAITING IN TRAFFIC JAMS.



POOR AIR QUALITY CAN AFFECT ADULTS AND CHILDREN, LEADING TO CANCER, ASTHMA, AND OTHER HEART AND LUNG CONDITIONS IMPACTING OVERALL QUALITY OF LIFE.

TRAFFIC LOCKED IN A STANDSTILL CAN ALSO MAKE IT DIFFICULT OR EVEN IMPOSSIBLE FOR EMERGENCY VEHICLES AND PERSONNEL TO RESPOND TO THOSE IN NEED.



I DON'T KNOW, MY ROAD RAGE SEEMS MORE IMPORTANT THAN ALL OF THOSE.

I HOPE YOU KNOW I CAN DETECT SARCASM, BEY.

THERE ARE EVEN MORE NEGATIVE IMPACTS OF GRIDLOCK, INCLUDING MILLIONS OF WASTED HOURS OF PRODUCTIVITY AND DELAYS ON GOODS AND SERVICES.



THERE IS ELEVATED SOUND POLLUTION FROM THE IDLING AND HONKING.





TOURISM CAN BE IMPACTED WITH GRIDLOCK DETERRING POTENTIAL VACATIONERS.



LOCAL BUSINESS CAN BE SIMILARLY AFFECTED.



ALRIGHT, YOU'VE CONVINCED ME THAT GRIDLOCK IS A REALLY BAD PROBLEM, POSSIBLY EVEN MORE THAN MY ROAD RAGE. BUT CAN ANYTHING BE DONE? HAVEN'T CARS BEEN STUCK IN TRAFFIC SINCE, I DON'T KNOW, CARS?



SOME TRAFFIC CONGESTION MAY ALWAYS BE EXPECTED, BEY, BUT THERE ARE MANY SOLUTIONS TO IMPROVE OR NEARLY ELIMINATE GRIDLOCK IN MOST SITUATIONS.

CAN'T ENGINEERS JUST BUILD MORE LANES FOR THE TRAFFIC?



DESIGNING AND ADDING EXTRA LANES IS AN AVAILABLE TOOL TO IMPROVE TRAFFIC FLOWS, BUT IT IS OFTEN SURPRISINGLY INEFFECTIVE. DEMAND TYPICALLY INCREASES WITH WIDER ROADS, AND MORE MERGING LANES CAN FURTHER SLOW DOWN TRAFFIC. THIS IS ALL ASSUMING THERE IS ROOM WITHIN THE RIGHT OF WAY TO ADD ADDITIONAL LANES. SOME COMMUNITIES HAVE BEEN DIVIDED OR COMPLETELY DESTROYED TO WIDEN HIGHWAYS.



SO THE SIMPLEST IDEA IS ALSO THE DUMBEST...



IT'S NOT DUMB, BEY, IT'S JUST NOT USUALLY PRACTICAL. THERE ARE MANY OTHER SOLUTIONS THAT ARE BOTH MORE EFFECTIVE AND MORE AFFORDABLE. IMAGINE IF MORE PEOPLE SIMPLY RODE THEIR BIKES TO WORK INSTEAD OF DRIVING CARS?



THE SAME CAN BE SAID FOR RIDING ELECTRIC SCOOTERS, OR EVEN WALKING TO WORK. THESE OPTIONS ARE NOT ONLY MORE AFFORDABLE, THEY ARE ALSO BETTER FOR YOUR HEALTH AND THE ENVIRONMENT.



BUT THIS IS ALL ASSUMING OUR CITIES ARE DESIGNED FOR SAFE AND EASY BIKING, WALKING AND ROLLING.

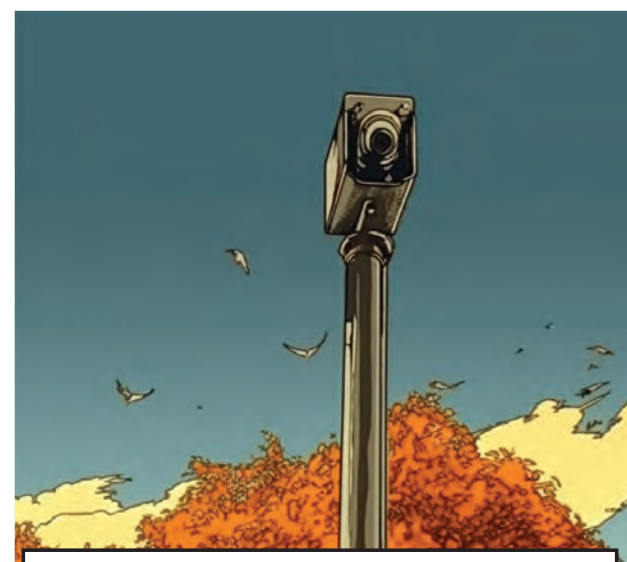
VERY GOOD, BEY. SOME CITIES ARE DEFINITELY DESIGNED AND BUILT BETTER FOR BEING WALKABLE AND RIDEABLE MORE THAN OTHERS. ENGINEERS AND PLANNERS ARE CONSTANTLY TRYING TO IMPROVE THE LAYOUT OF CITIES AND ROADS, EVEN WITH THE CONSTRAINTS ON SPACE, BUDGET AND OTHER FACTORS.



COMPLETE STREETS AND ACTIVE TRANSPORTATION PROGRAMS AIM TO REPRIORITIZE STREETS TO ASSIST THE MOST VULNERABLE USERS. THIS CAN INCLUDE ADDING BIKE LANES, WIDENING SIDEWALKS, IMPROVING TRANSIT, GREENING AND BEAUTIFICATION, AND OTHER DESIGN ELEMENTS. VEHICLE LANES ARE OFTEN REMOVED TO MAKE SPACE FOR THESE IMPROVEMENTS THAT ENCOURAGE YOU TO CHOOSE ANOTHER MODE OF TRAVEL.




ENGINEERS AND PLANNERS CAN ALSO WORK IN A COORDINATED EFFORT TO DESIGN AND NETWORK ALL OF THESE STREETS AND HIGHWAYS TOGETHER USING THE LATEST INNOVATIONS AND TECHNOLOGY. TRAFFIC SIGNAL COORDINATION ON A MACRO SCALE CAN VASTLY IMPROVE TRAVEL TIMES, IMPROVE SAFETY AND REDUCE GRIDLOCK.




SENSORS AND CAMERAS ALONG CORRIDORS CAN PROVIDE VALUABLE DATA USED TO MANAGE AND CONTROL THESE NETWORKS FOR OPTIMIZED EFFICIENCY.




HIGHWAY TRAFFIC MANAGEMENT ELEMENTS LIKE TOLLING AND HIGH OCCUPANCY VEHICLE (HOV) LANES CAN LOWER THE NUMBER OF VEHICLES IN THE ROAD. RAMP METERING CAN ALSO BE AN EFFECTIVE STRATEGY FOR REDUCING GRIDLOCK ON FREEWAYS.




AND PUBLIC TRANSPORTATION PLAYS A VITAL ROLE IN THE ALLEVIATION OF GRIDLOCK - BOTH FROM THE DESIGN AND GENERAL PUBLIC PERSPECTIVES.



AS GOVERNMENTS MAKE PUBLIC TRANSPORTATION MORE AVAILABLE AND RELIABLE, PEOPLE CAN OFTEN COMMUTE MORE EFFICIENTLY, MORE SAFELY AND MORE AFFORDABLY.



YEAH, I SAW A PICTURE ON SOCIAL MEDIA SHOWING HOW MUCH SPACE COULD BE SAVED ON A ROAD IF EVERYONE RODE THE BUS INSTEAD OF TAKING THEIR OWN VEHICLE TO WORK.



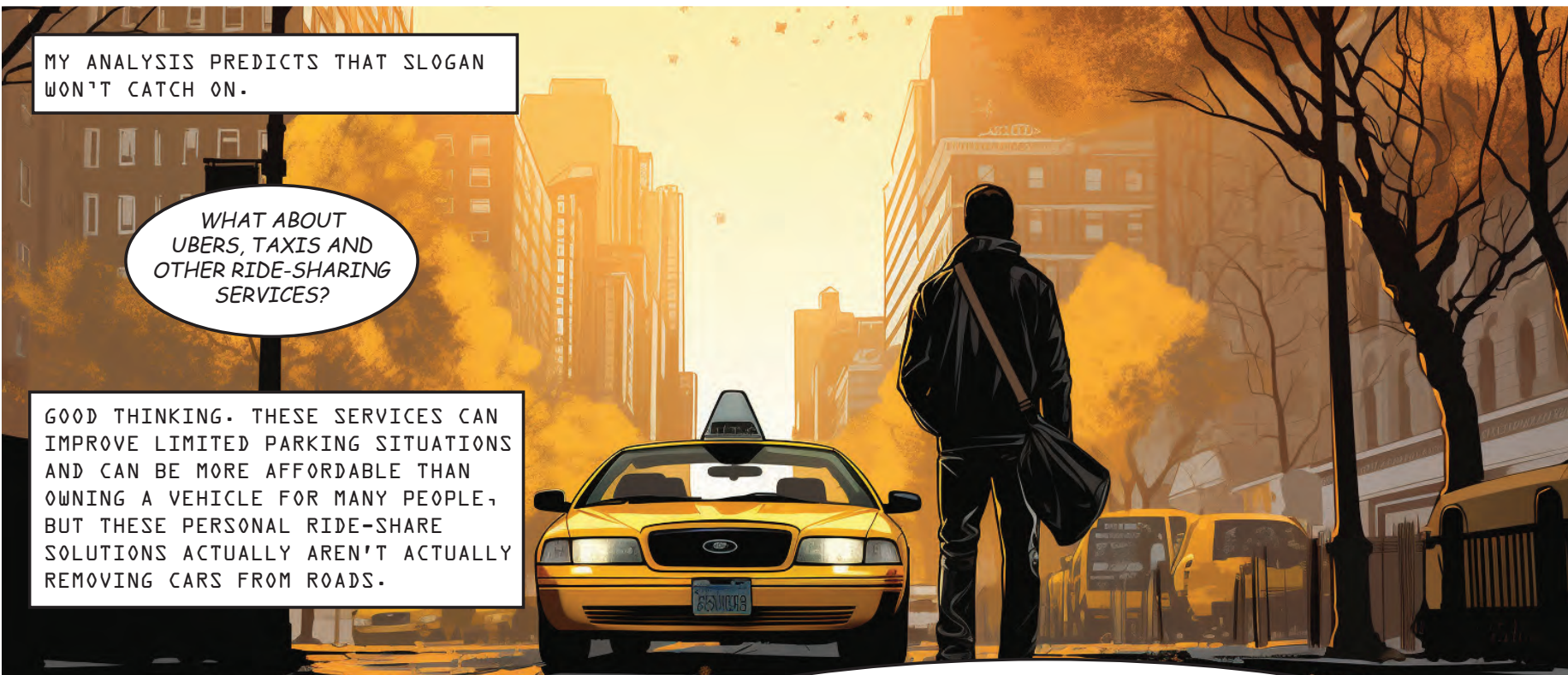
EXACTLY. IT ISN'T DIFFICULT TO IMAGINE HOW MANY TRAFFIC JAMS COULD BE AVOIDED IF JUST A FRACTION OF COMMUTERS OPTED FOR GROUP TRANSPORTATION OPTIONS LIKE RAIL, BUSES AND SUBWAYS, LET ALONE WALKING AND BIKING TO WORK AND OTHER EVENTS.



OR EVEN WORKING REMOTELY WHEN POSSIBLE.



HOW ABOUT A NEW SLOGAN- 'STAY ON THE INFORMATION HIGHWAY AND OFF THE ACTUAL HIGHWAY'



MY ANALYSIS PREDICTS THAT SLOGAN WON'T CATCH ON.

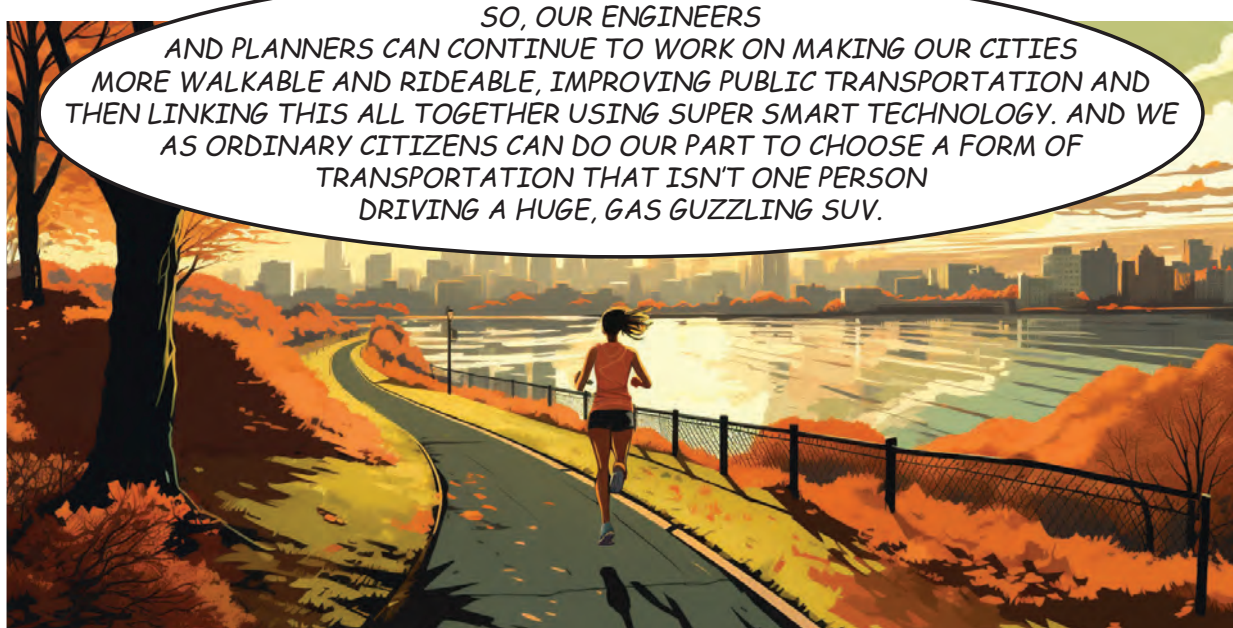
WHAT ABOUT UBERS, TAXIS AND OTHER RIDE-SHARING SERVICES?

GOOD THINKING. THESE SERVICES CAN IMPROVE LIMITED PARKING SITUATIONS AND CAN BE MORE AFFORDABLE THAN OWNING A VEHICLE FOR MANY PEOPLE, BUT THESE PERSONAL RIDE-SHARE SOLUTIONS ACTUALLY AREN'T ACTUALLY REMOVING CARS FROM ROADS.



SO, MARGINALLY BETTER BUT NOT A GREAT OPTION?

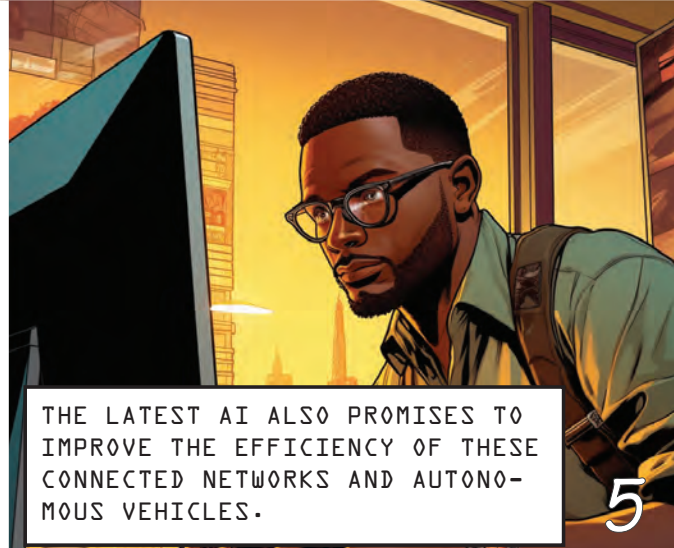
DEFINITELY NOT THE BEST ONE, BEY.



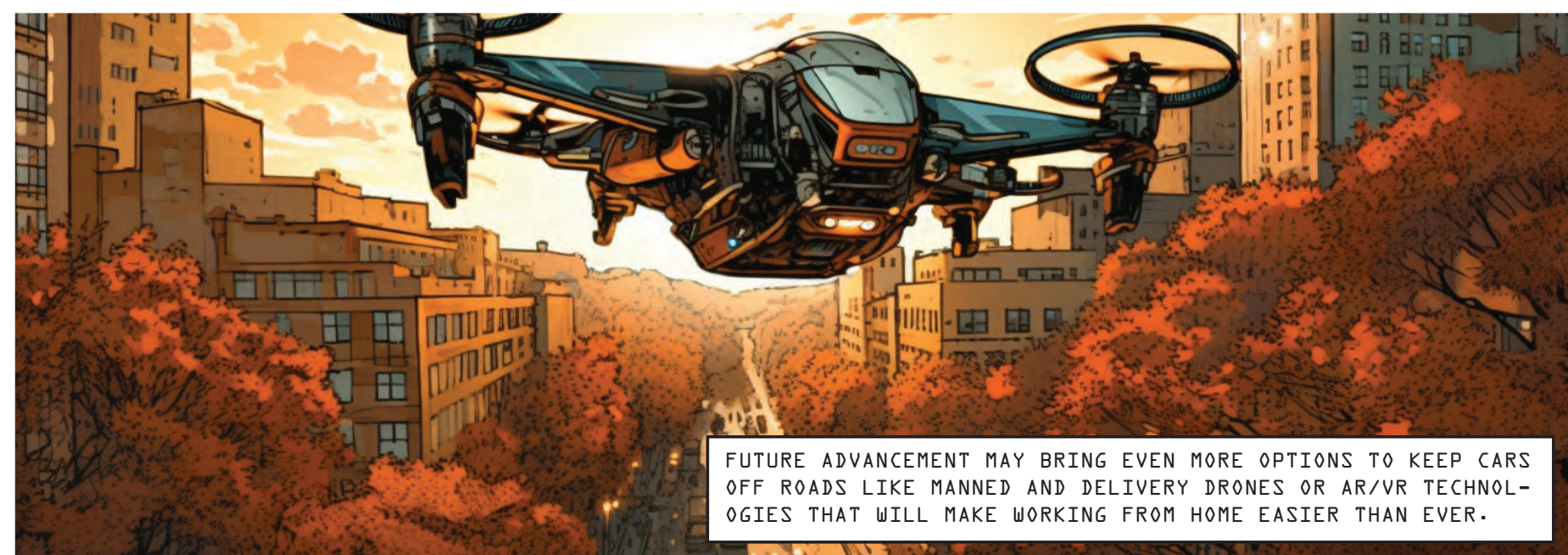
SO, OUR ENGINEERS AND PLANNERS CAN CONTINUE TO WORK ON MAKING OUR CITIES MORE WALKABLE AND RIDEABLE, IMPROVING PUBLIC TRANSPORTATION AND THEN LINKING THIS ALL TOGETHER USING SUPER SMART TECHNOLOGY. AND WE AS ORDINARY CITIZENS CAN DO OUR PART TO CHOOSE A FORM OF TRANSPORTATION THAT ISN'T ONE PERSON DRIVING A HUGE, GAS GUZZLING SUV.



WELL PUT, BEY. THE FUTURE WILL BRING EVEN MORE OPTIONS FOR IMPROVING TRAFFIC CONGESTION AND GRIDLOCK, LIKE AUTONOMOUS VEHICLES. WHILE THESE MAY MEAN MORE CARS ON THE ROAD, THEY WILL BE MORE EFFICIENT, SAFER AND CAN COORDINATE WITH CONNECTED NETWORKS FOR BETTER OVERALL TRANSPORTATION MANAGEMENT. AUTONOMOUS TRANSIT PROMISES EVEN MORE EFFICIENCIES.



THE LATEST AI ALSO PROMISES TO IMPROVE THE EFFICIENCY OF THESE CONNECTED NETWORKS AND AUTONOMOUS VEHICLES.



FUTURE ADVANCEMENT MAY BRING EVEN MORE OPTIONS TO KEEP CARS OFF ROADS LIKE MANNED AND DELIVERY DRONES OR AR/VR TECHNOLOGIES THAT WILL MAKE WORKING FROM HOME EASIER THAN EVER.



ELIMINATING GRIDLOCK ISN'T JUST A FAR OFF WISH, BUT IT IS SOMETHING THAT CAN BE IMPROVED TODAY. WE DON'T HAVE TO WAIT FOR THE FUTURE. WITH OUR EXISTING SOLUTIONS AND RESOURCES, WE CAN GET MORE PEOPLE OFF THE ROAD EVERYDAY.



AND ONTO THE 'INFORMATION HIGHWAY'.





NO ONE IS EVER GOING TO SAY THAT, BEY.

I CAN SAY IT.

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BEYONDTYPICALS

6

BEYOND VS

DISTRACTED DRIVING

#3





I DETECT THAT YOU ARE FEELING SAD, BEY. WHAT HAPPENED?

MY FRIEND'S COUSIN DIED TODAY. I DIDN'T REALLY KNOW HER, BUT I'M PRETTY SHAKEN UP.



I'M SO SORRY. DO YOU KNOW WHAT HAPPENED?

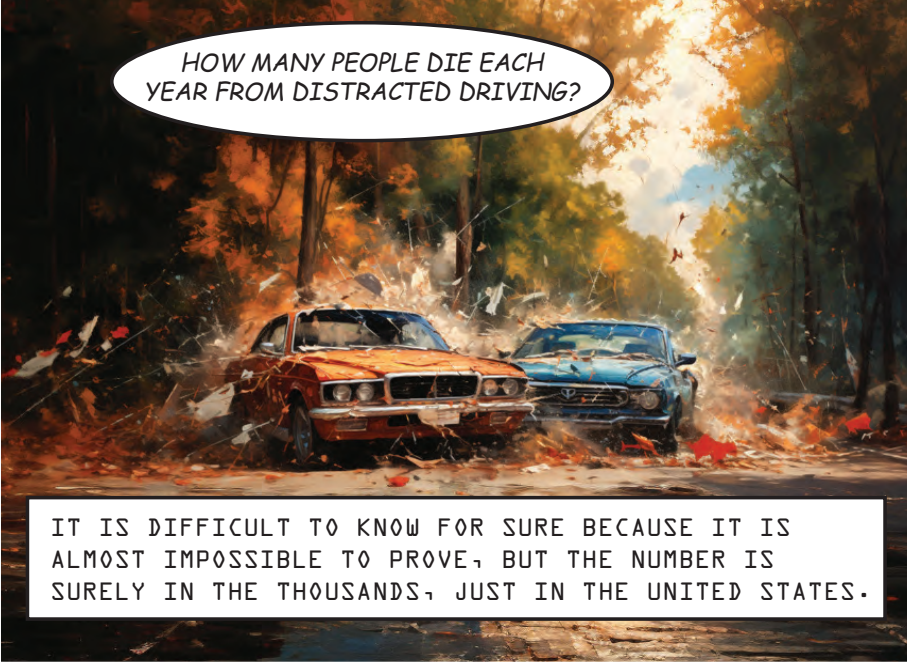
SHE WAS GOING TO CLASS AND WAS HIT BY AN SUV. THEY AREN'T EXACTLY SURE WHAT HAPPENED YET, BUT THEY THINK THE OTHER DRIVER WAS TEXTING AND DRIVING.

SUCH A SAD LOSS OF LIFE.



I'M NOT GOING TO LIE AND SAY THAT I NEVER USE MY PHONE WHILE DRIVING, BUT I REALLY TRY NOT TO. I GUESS I DIDN'T REALIZE HOW DANGEROUS IT ACTUALLY CAN BE.

DISTRACTED DRIVING IS EXTREMELY DANGEROUS.

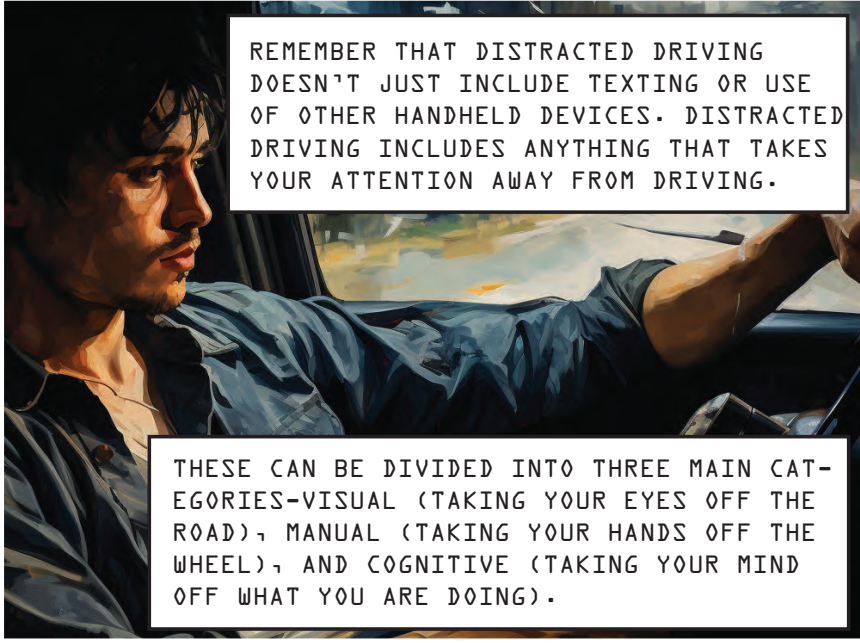


HOW MANY PEOPLE DIE EACH YEAR FROM DISTRACTED DRIVING?

IT IS DIFFICULT TO KNOW FOR SURE BECAUSE IT IS ALMOST IMPOSSIBLE TO PROVE, BUT THE NUMBER IS SURELY IN THE THOUSANDS, JUST IN THE UNITED STATES.

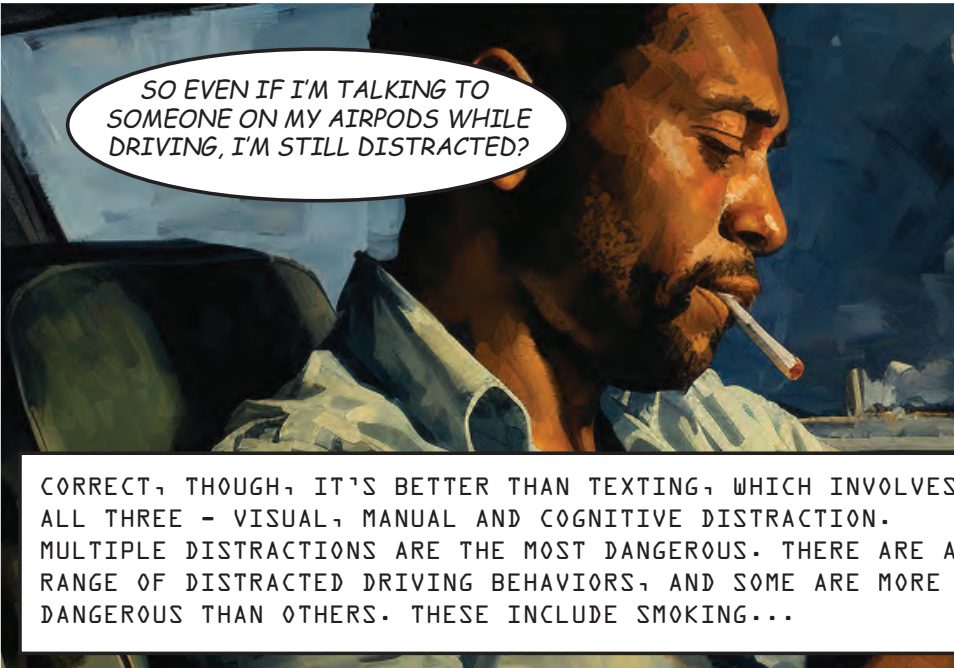


I ALWAYS SEE PEOPLE TEXTING WHILE DRIVING, AND IT MAKES ME UPSET... BUT SOMETIMES I DO IT TOO. I FEEL LIKE SUCH A HYPOCRITE.



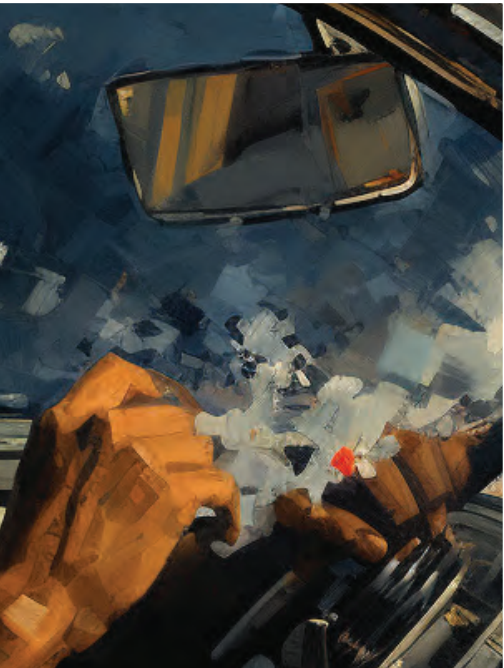
REMEMBER THAT DISTRACTED DRIVING DOESN'T JUST INCLUDE TEXTING OR USE OF OTHER HANDHELD DEVICES. DISTRACTED DRIVING INCLUDES ANYTHING THAT TAKES YOUR ATTENTION AWAY FROM DRIVING.

THESE CAN BE DIVIDED INTO THREE MAIN CATEGORIES-VISUAL (TAKING YOUR EYES OFF THE ROAD), MANUAL (TAKING YOUR HANDS OFF THE WHEEL), AND COGNITIVE (TAKING YOUR MIND OFF WHAT YOU ARE DOING).



SO EVEN IF I'M TALKING TO SOMEONE ON MY AIRPODS WHILE DRIVING, I'M STILL DISTRACTED?

CORRECT, THOUGH, IT'S BETTER THAN TEXTING, WHICH INVOLVES ALL THREE - VISUAL, MANUAL AND COGNITIVE DISTRACTION. MULTIPLE DISTRACTIONS ARE THE MOST DANGEROUS. THERE ARE A RANGE OF DISTRACTED DRIVING BEHAVIORS, AND SOME ARE MORE DANGEROUS THAN OTHERS. THESE INCLUDE SMOKING...



...HAVING CHILDREN OR PETS UNRESTRAINED IN A VEHICLE...

...OR EATING.

...ADJUSTING THE RADIO OR GPS...

IS THAT... ALL?

IS IT ALWAYS THAT DANGEROUS? IT'S USUALLY JUST A GLANCE.

NO, THERE ARE MORE. REACHING FOR OBJECTS, GROOMING OR EVEN TALKING TO OTHERS IN THE VEHICLE.

IF YOU LOOK AT YOUR PHONE FOR JUST 5 SECONDS, YOU WOULD DRIVE THE LENGTH OF AN ENTIRE FOOTBALL FIELD AT 55 MPH.

EVEN IN IDEAL CONDITIONS IT IS DANGEROUS, BUT OTHER FACTORS CAN INCREASE THE SEVERITY.

LIKE WHAT?

IMAGINE LOSING FOCUS FOR AN ENTIRE FOOTBALL FIELD AND THEN INCLUDE ELEMENTS LIKE SNOW, CONSTRUCTION OR UNFAMILIAR ROADS...

...OR SOMEONE UNEXPECTEDLY CROSSING IN FRONT OF YOU WHILE YOU AREN'T FOCUSED. ALSO, CONSIDER ALL THESE SCENARIOS WITH OTHER DISTRACTED DRIVERS AROUND YOU.

OKAY, I GET IT. YOU'RE WAY MORE LIKELY TO GET IN AN ACCIDENT WHEN DRIVING DISTRACTED

MANY EXPERTS IN TRANSPORTATION SAFETY PREFER YOU DON'T CALL THEM 'ACCIDENTS'.

WHY?

SOME ARGUE THAT BY LABELING THESE INCIDENTS AS 'ACCIDENTS' IT IMPLIES NO ONE IS RESPONSIBLE, AND DOWNPLAYS THE PREVENTABILITY OF THESE EVENTS.

I TOTALLY GET THAT. I CAN'T BELIEVE I'VE NEVER THOUGHT OF THAT BEFORE.

SO WHAT CAN BE DONE ABOUT DISTRACTED DRIVING? THERE ARE THOUSANDS OF PEOPLE THAT DIE EVERY YEAR THAT DON'T HAVE TO!

CORRECT. AND, AS WITH MOST THINGS, MUCH IS ALREADY BEING DONE. THERE ARE ENGINEERS AND ADVOCATES THAT ARE WORKING TIRELESSLY THROUGH DESIGN AND PUBLIC OUTREACH TO LOWER THESE NUMBERS AS MUCH AS POSSIBLE.

INITIATIVES SUCH AS 'ZERO FATALITIES' INFORM THE PUBLIC OF THESE DANGERS USING A VARIETY OF OUTREACH METHODS, INCLUDING ADVERTISING AND IN-PERSON MEETINGS.

ACTUALLY, I REMEMBER SOMETHING LIKE THAT. SOMEONE CAME TO MY HIGH SCHOOL WITH A VR HEADSET, AND WE WERE ABLE TO WATCH THIS IMMERSIVE EXPERIENCE WHERE THE CAR YOU WERE DRIVING ACTUALLY CRASHED FROM DISTRACTED DRIVING.

IT REALLY AFFECTED ME AT THE TIME.

YES, MANY AGENCIES AND ORGANIZATIONS HAVE USED VR AND OTHER TECHNOLOGIES TO HELP DRIVE HOME THE SEVERITY OF DISTRACTED DRIVING.



I ASSURE YOU THAT WAS NOT INTENTIONAL.

WOW. 'DRIVE HOME'? PUNS WHILE TALKING ABOUT SOMETHING SO SERIOUS?



SURE, WHATEVER. I DO FEEL LIKE A LECTURE ON PUBLIC TRANSIT IS COMING...

YOU ARE CORRECT AGAIN, BEY. DISTRACTIONS OF ALL KINDS ARE PERFECTLY SAFE WHEN SOMEONE ELSE IS DRIVING. THIS INCLUDES LIGHT RAIL AND BUSES...



...AS WELL AS SHARED RIDE SERVICES LIKE TAXI AND UBER.



AND, HOPEFULLY SOON, AUTONOMOUS VEHICLES WILL DRAMATICALLY CHANGE WHAT IS ACCEPTABLE DRIVING BEHAVIOR.



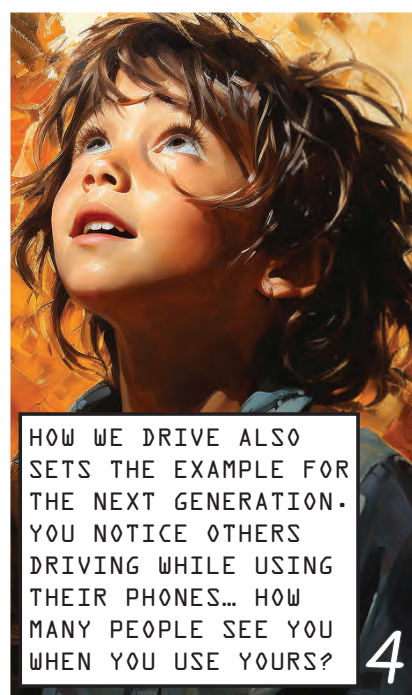
I HADN'T EVEN CONSIDERED THAT. ONCE OUR CARS ARE DOING ALL THE DRIVING, IT DOESN'T MATTER WHAT WE ARE DOING!



CORRECT, BEY. EVEN SLEEPING IN CARS COULD BE ACCEPTABLE ONCE AUTONOMOUS VEHICLES SURPASS THE SAFETY OF HUMAN DRIVERS. IF THERE IS ONE THING THAT COULD ELIMINATE THE DANGERS OF DISTRACTED DRIVING, IT MAY BE SELF-DRIVING VEHICLES.



AND DON'T FORGET, THERE ARE OTHER REASONS TO NOT DRIVE DISTRACTED. IN MOST PLACES IT IS AGAINST THE LAW TO USE MOBILE DEVICES WHILE DRIVING AND PENALTIES CAN INCLUDE TICKETS OR MORE SERIOUS LEGAL CONSEQUENCES.



HOW WE DRIVE ALSO SETS THE EXAMPLE FOR THE NEXT GENERATION. YOU NOTICE OTHERS DRIVING WHILE USING THEIR PHONES... HOW MANY PEOPLE SEE YOU WHEN YOU USE YOURS?



I THINK THE BEST THING I CAN DO IS JUST STOP DRIVING DISTRACTED MYSELF. GETTING MYSELF HURT WOULD BE AWFUL, BUT HURTING OR KILLING SOMEONE ELSE IS ONE OF THE MOST HORRIFIC THINGS I CAN IMAGINE.

IT HAPPENS MORE THAN WE'D LIKE TO ADMIT, BEY.



WELL, I CAN AT LEAST START WITH MYSELF. YOU HEARD IT HERE FIRST, OND. I'M DONE DRIVING DISTRACTED. FEEL FREE TO WARN ME IF I'M TEMPTED.

IF YOU WERE WEARING ME WHILE DRIVING, YOU WOULD LITERALLY BE DRIVING DISTRACTED.

SOMETIMES YOU CAN BE, JUST... THE WORST.



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BEYOND VS

URBAN SPRAWL



#4



AND, I NEED YOUR HELP.

OF COURSE, BEY.



MY AUNT HAS A HOMESTEAD WITH A FEW ACRES, AND THE GOVERNMENT SAID THEY MAY TAKE IT FROM HER TO BUILD A HIGHWAY.

THAT IS UNFORTUNATE.



I MEAN, CAN THEY JUST DO THAT? SHE KIND OF LIVES IN THE MIDDLE OF NOWHERE, BUT APPARENTLY THE HIGHWAY WILL BE 'NECESSARY' FOR COMMUTERS.



HOW CAN I HELP?



WELL... THEY ARE HOLDING A MEETING NEXT WEEK TO GET FEEDBACK FROM THE COMMUNITY ON THE DESIGN, AND I WANT YOU TO HELP ME LEARN ALL ABOUT THIS, SO I CAN GO PREPARED.

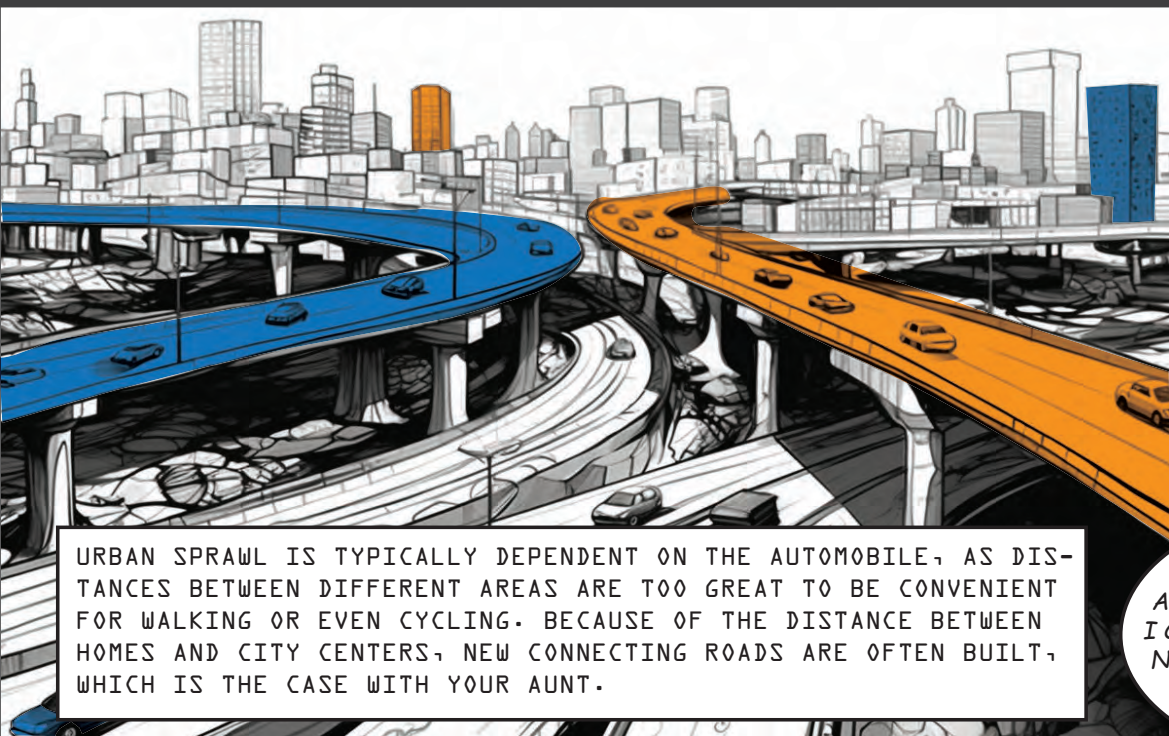
AND YOU SEEM PRETTY, UM... OBSESSED WITH TRANSPORTATION AND INFRASTRUCTURE, SO I FIGURED YOU WOULD BE A GOOD ONE TO ASK.

I'LL TAKE THAT AS A COMPLIMENT.



WHAT IS HAPPENING WITH YOUR AUNT IS A SYMPTOM OF WHAT IS OFTEN REFERRED TO AS 'URBAN SPRAWL', WHICH IS THE UNCONTROLLED AND OFTEN POORLY PLANNED EXPANSION OF URBAN AREAS INTO SURROUNDING RURAL REGIONS.

THIS IS OFTEN CHARACTERIZED BY LOW-DENSITY DEVELOPMENT, WHICH INCLUDES SINGLE-FAMILY HOMES, SHOPPING CENTERS, AND BUSINESS PARKS THAT ARE USUALLY SPREAD OUT OVER A LARGE AREA.



URBAN SPRAWL IS TYPICALLY DEPENDENT ON THE AUTOMOBILE, AS DISTANCES BETWEEN DIFFERENT AREAS ARE TOO GREAT TO BE CONVENIENT FOR WALKING OR EVEN CYCLING. BECAUSE OF THE DISTANCE BETWEEN HOMES AND CITY CENTERS, NEW CONNECTING ROADS ARE OFTEN BUILT, WHICH IS THE CASE WITH YOUR AUNT.

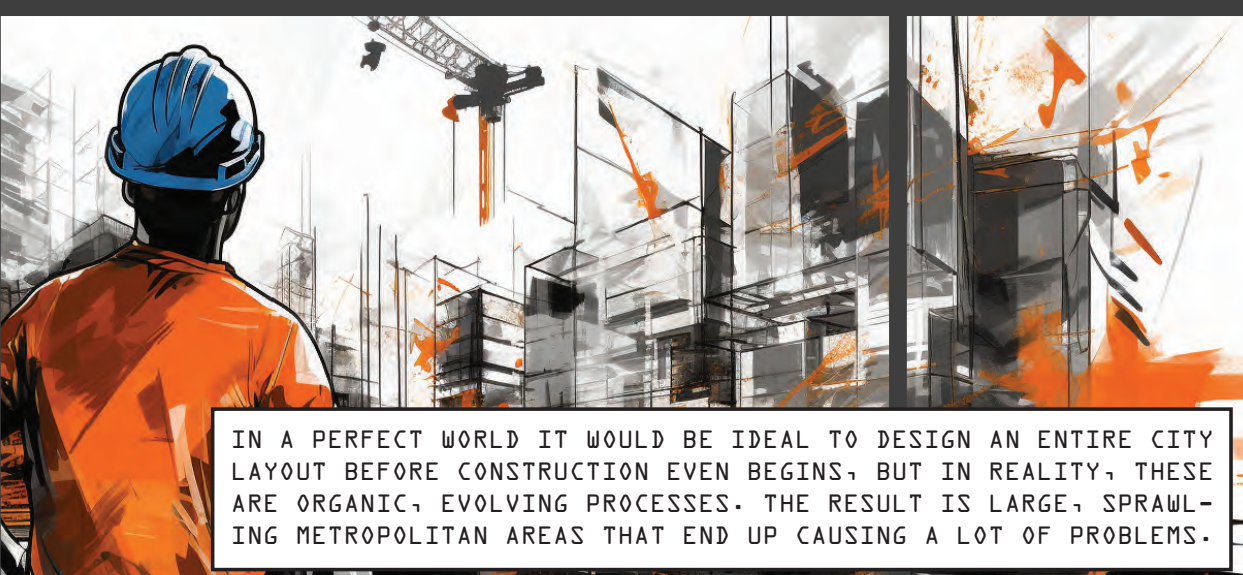


HOW DOES THIS HAPPEN? WHEN I WAS AT COLLEGE, IT SEEMED LIKE I COULD WALK EVERYWHERE I NEEDED TO GO. THEN AGAIN, I WAS LIVING IN A MORE CENTRALLY BUILT CITY.



OTHER FACTORS THAT CAUSE URBAN SPRAWL INCLUDE TAX POLICIES, LAND USE AND ZONING, AUTOMOBILE DEPENDENCE AND URBAN DECAY, JUST TO NAME A FEW.

RAPID POPULATION GROWTH IS OFTEN THE MAIN CULPRIT. WHEN CITIES GROW FASTER THAN THEY CAN BE PROPERLY PLANNED, ENGINEERS DO THE BEST THEY CAN TO CONNECT ISOLATED CENTERS USING ROADS OR OTHER FORMS OF TRANSPORTATION.

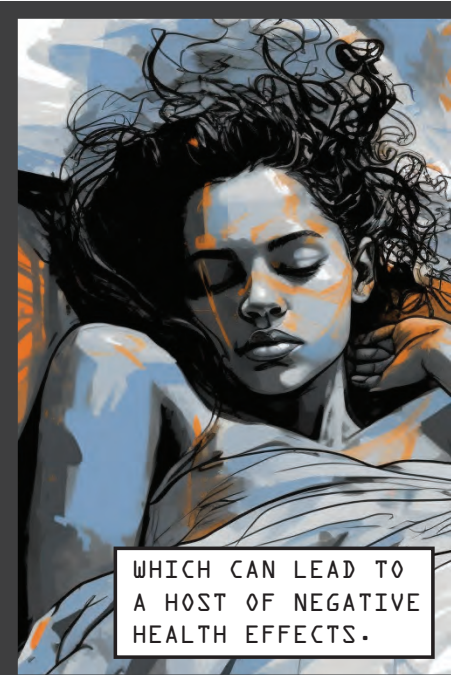


IN A PERFECT WORLD IT WOULD BE IDEAL TO DESIGN AN ENTIRE CITY LAYOUT BEFORE CONSTRUCTION EVEN BEGINS, BUT IN REALITY, THESE ARE ORGANIC, EVOLVING PROCESSES. THE RESULT IS LARGE, SPRAWLING METROPOLITAN AREAS THAT END UP CAUSING A LOT OF PROBLEMS.



LIKE WHAT?

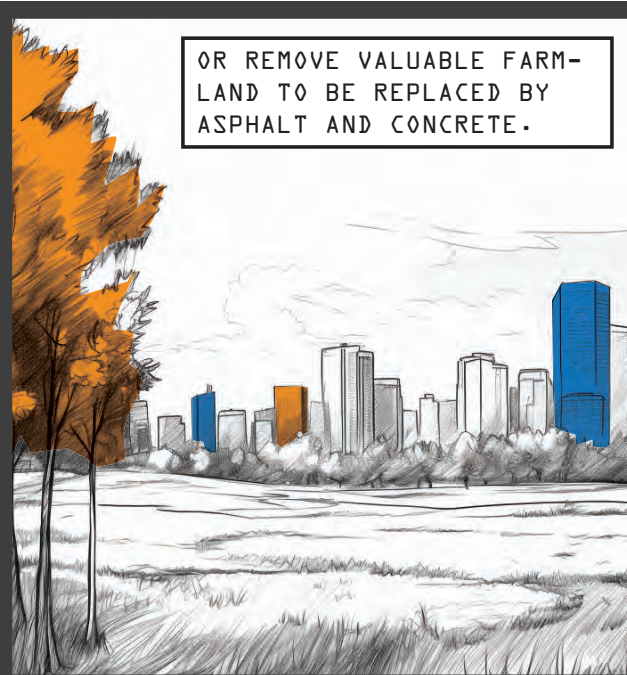
MANY OF THE WORST PARTS OF LIVING IN A CITY, INCLUDING LONG COMMUTE TIMES AND POOR AIR QUALITY FROM EXCESS TRAFFIC.



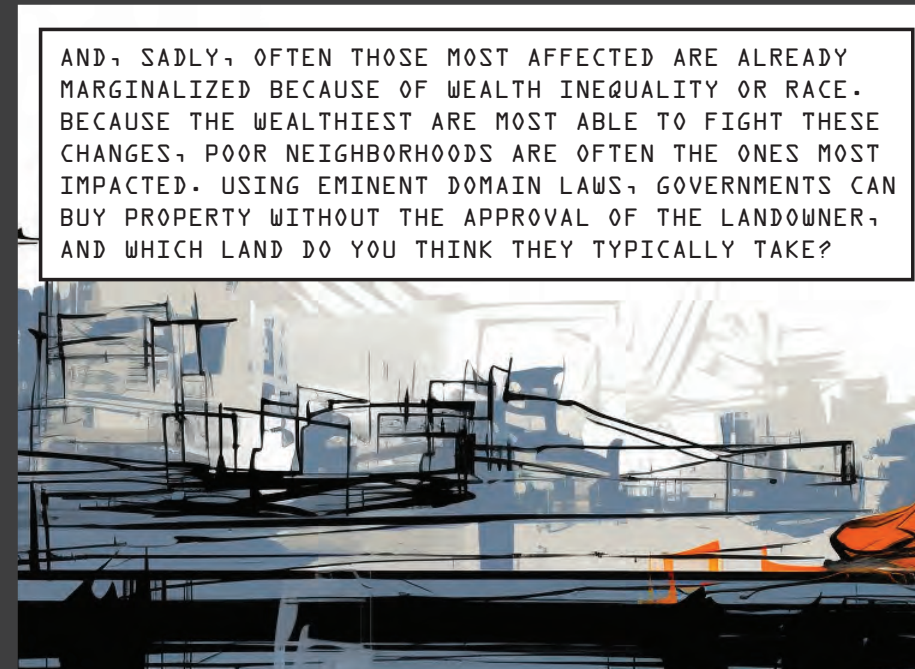
WHICH CAN LEAD TO A HOST OF NEGATIVE HEALTH EFFECTS.



URBAN SPRAWL CAN ALSO MAKE CONSTRUCTION OF INFRASTRUCTURE ELEMENTS LIKE BUILDINGS AND ROADS MORE EXPENSIVE.

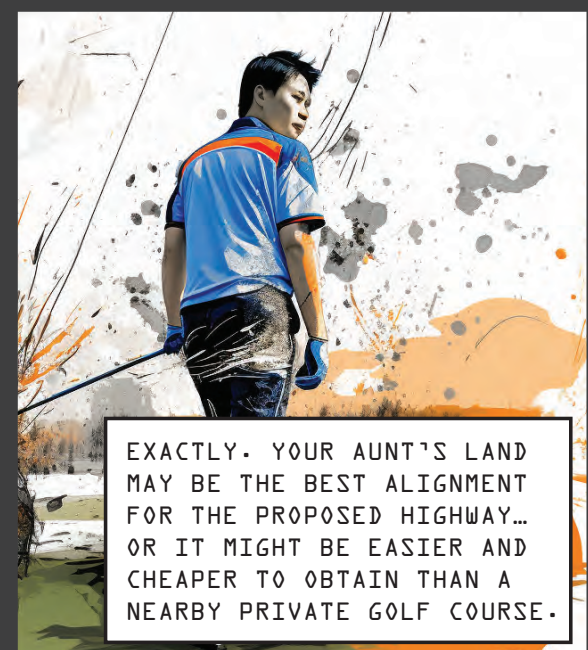


OR REMOVE VALUABLE FARM-LAND TO BE REPLACED BY ASPHALT AND CONCRETE.

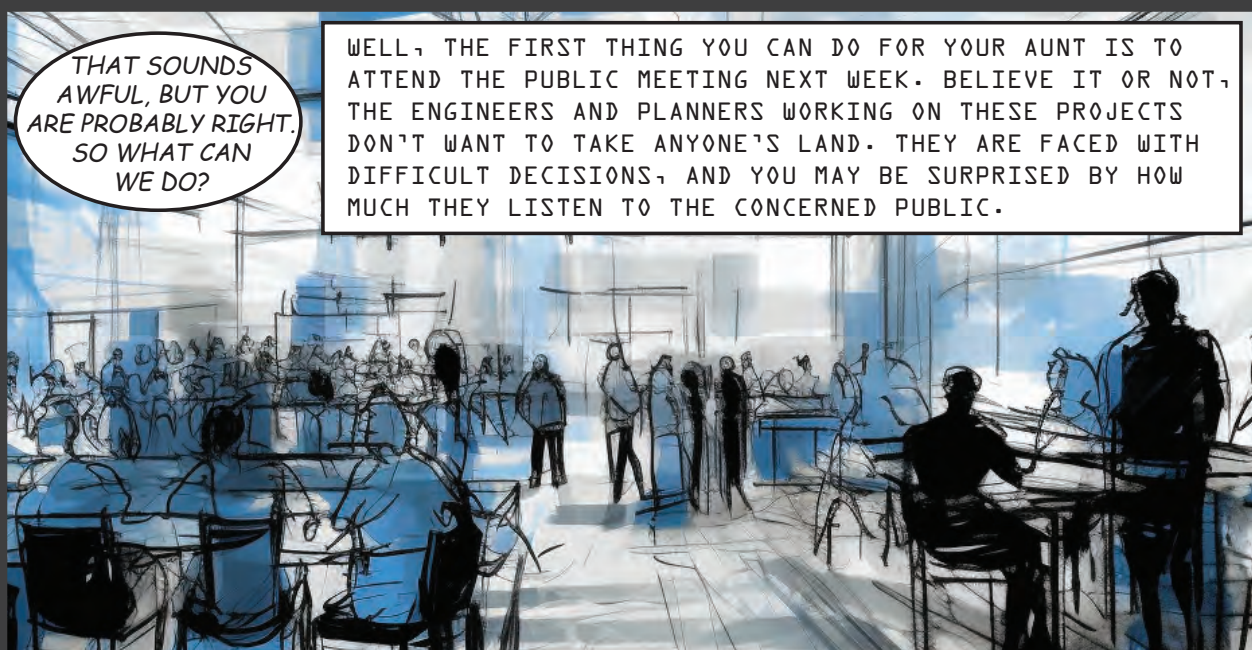


AND, SADLY, OFTEN THOSE MOST AFFECTED ARE ALREADY MARGINALIZED BECAUSE OF WEALTH INEQUALITY OR RACE. BECAUSE THE WEALTHIEST ARE MOST ABLE TO FIGHT THESE CHANGES, POOR NEIGHBORHOODS ARE OFTEN THE ONES MOST IMPACTED. USING EMINENT DOMAIN LAWS, GOVERNMENTS CAN BUY PROPERTY WITHOUT THE APPROVAL OF THE LANDOWNER, AND WHICH LAND DO YOU THINK THEY TYPICALLY TAKE?

THE LAND WHERE THE POOREST PEOPLE LIVE BECAUSE IT'S THE CHEAPEST.

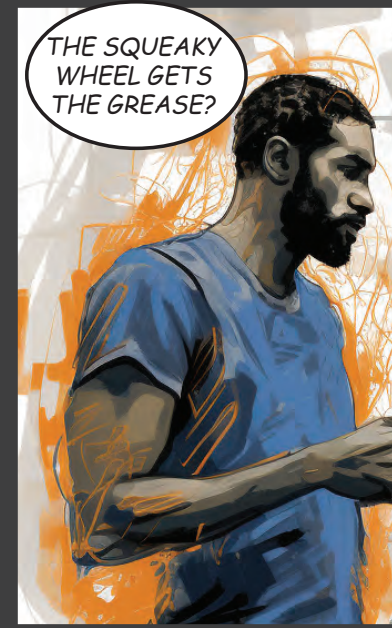


EXACTLY. YOUR AUNT'S LAND MAY BE THE BEST ALIGNMENT FOR THE PROPOSED HIGHWAY... OR IT MIGHT BE EASIER AND CHEAPER TO OBTAIN THAN A NEARBY PRIVATE GOLF COURSE.



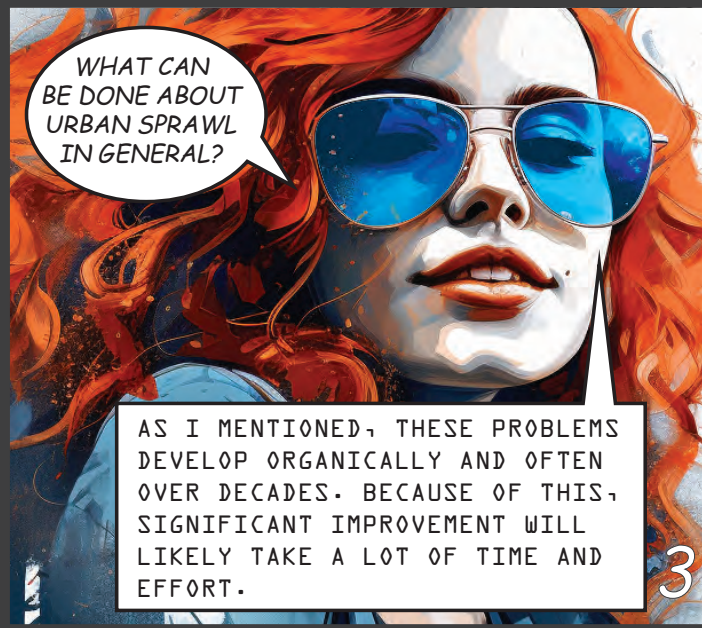
THAT SOUNDS AWFUL, BUT YOU ARE PROBABLY RIGHT. SO WHAT CAN WE DO?

WELL, THE FIRST THING YOU CAN DO FOR YOUR AUNT IS TO ATTEND THE PUBLIC MEETING NEXT WEEK. BELIEVE IT OR NOT, THE ENGINEERS AND PLANNERS WORKING ON THESE PROJECTS DON'T WANT TO TAKE ANYONE'S LAND. THEY ARE FACED WITH DIFFICULT DECISIONS, AND YOU MAY BE SURPRISED BY HOW MUCH THEY LISTEN TO THE CONCERNED PUBLIC.



THE SQUEAKY WHEEL GETS THE GREASE?

SOMETHING LIKE THAT. IF YOU CAN GET INFORMED AS MUCH AS POSSIBLE- BOTH SPECIFICALLY ABOUT THAT PROJECT AND IN GENERAL ABOUT THESE ISSUES- YOU WILL BE BEST PREPARED TO HELP YOUR AUNT KEEP HER LAND.



WHAT CAN BE DONE ABOUT URBAN SPRAWL IN GENERAL?

AS I MENTIONED, THESE PROBLEMS DEVELOP ORGANICALLY AND OFTEN OVER DECADES. BECAUSE OF THIS, SIGNIFICANT IMPROVEMENT WILL LIKELY TAKE A LOT OF TIME AND EFFORT.

BETTER METHODS AND STANDARDS IN URBAN AND TRANSPORTATION PLANNING ARE HELPING IDENTIFY THE ISSUES AND OFFER MORE EFFECTIVE SOLUTIONS. ENGINEERS AND PLANNERS ARE ALREADY ACTIVELY WORKING ON THESE PROBLEMS.

MANY OF THESE ISSUES INVOLVE ZONING, WHICH SEPARATES DIFFERENT TYPES OF LAND USE. CITIZENS CAN WORK TOWARDS ZONING REFORM TO ALLOW FOR MIXED-USE DEVELOPMENT FOR MORE COMPACT, WALKABLE COMMUNITIES. SMART GROWTH PRINCIPLES ALSO PROMOTE THE CREATION OF SUSTAINABLE, LIVABLE AND ECONOMICALLY VIBRANT COMMUNITIES.



URBAN GROWTH BOUNDARIES AND GREEN BELTS CAN LIMIT URBAN SPRAWL BY RESTRICTING WHERE NEW DEVELOPMENT CAN OCCUR AND HELP PROTECT NATURAL AND AGRICULTURAL LAND.



COORDINATED PLANNING AT THE REGIONAL LEVEL CAN HELP MANAGE GROWTH MORE EFFECTIVELY AND PREVENT UNCONTROLLED SPRAWL. THIS CAN INVOLVE SETTING REGIONAL GROWTH STRATEGIES, COORDINATING INFRASTRUCTURE INVESTMENT, AND PROMOTING COOPERATION AMONG DIFFERENT MUNICIPALITIES.

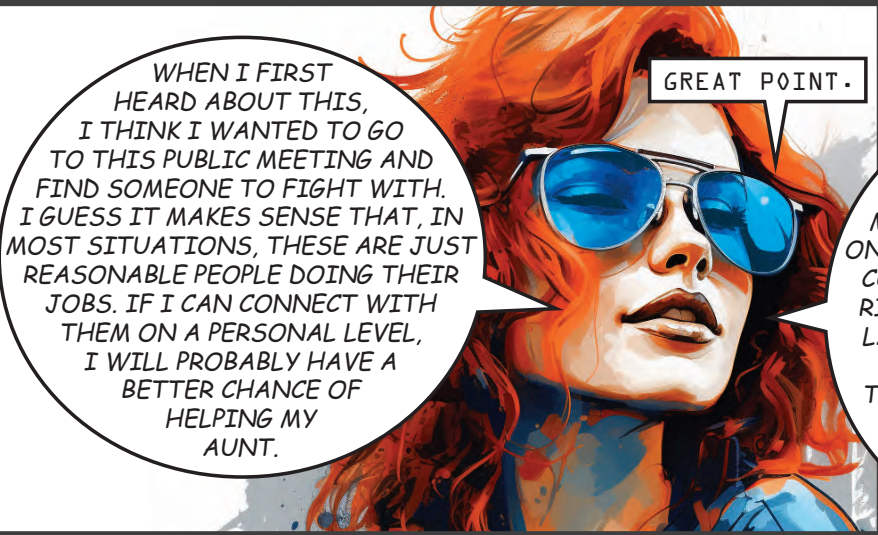
EXISTING URBAN AREAS CAN ALSO BE REVITALIZED TO BE MORE ATTRACTIVE AND LIVABLE. THIS CAN INCLUDE IMPROVING PUBLIC SPACES, UPGRADING INFRASTRUCTURE AND ENCOURAGING ECONOMIC DEVELOPMENT.



AND DON'T FORGET THAT YOU, AND OTHERS LIKE YOU, CAN MAKE A REAL DIFFERENCE IN ALL OF THIS. AS THE PUBLIC BECOMES MORE INFORMED AND INVOLVED IN THE PLANNING PROCESS, DESIGN DECISIONS WILL BETTER REFLECT THE NEEDS AND DESIRES OF THE COMMUNITY.



REMEMBER, MOST ENGINEERS AND PLANNERS WANT FEEDBACK FROM THE COMMUNITY. THEY ARE OFTEN FACED WITH DIFFICULT DECISIONS. IF THEY BETTER UNDERSTAND WHAT THE MEMBERS OF THE COMMUNITY WANT, IT CAN HELP TIP THE SCALE TOWARD A MORE WALKABLE, SUSTAINABLE FUTURE.



WHEN I FIRST HEARD ABOUT THIS, I THINK I WANTED TO GO TO THIS PUBLIC MEETING AND FIND SOMEONE TO FIGHT WITH. I GUESS IT MAKES SENSE THAT, IN MOST SITUATIONS, THESE ARE JUST REASONABLE PEOPLE DOING THEIR JOBS. IF I CAN CONNECT WITH THEM ON A PERSONAL LEVEL, I WILL PROBABLY HAVE A BETTER CHANCE OF HELPING MY AUNT.

GREAT POINT.

I'VE ALSO BEEN TRYING TO LIMIT MY OWN DEPENDENCE ON DRIVING, TAKING THE COMMUTER TRAIN AND RIDING MY EBIKE MORE LATELY. IT SEEMS LIKE IF MORE PEOPLE DID THAT, THEY WOULDN'T EVEN NEED THIS FREEWAY IN THE FIRST PLACE.

THAT'S GREAT TO HEAR. AND, YOU ARE CORRECT THAT MORE USE OF PUBLIC TRANSPORTATION WOULD DISINCENTIVIZE ROADWAY-CONNECTED CITY CENTERS THAT TAKE UP MUCH MORE SPACE.



I GUESS I WISH EVERY CITY COULD BE REDESIGNED FROM SCRATCH TO BE PERFECTLY PLANNED, EQUITABLE, WALKABLE... ALL THE THINGS. BUT THAT JUST ISN'T REALITY. WE HAVE AN AMAZING, BUT IMPERFECT, WORLD BASED ON THE BRILLIANCE AND SACRIFICES OF SO MANY. IT'S OUR JOB TO MAKE THE WORLD WE HAVE A BETTER PLACE.



I COULDN'T HAVE SAID IT BETTER MYSELF.

YEAH, RIGHT.



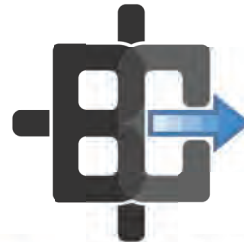
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BEYOND VS

UGLY CITIES

#5





I'M LISTENING.

AND, I'VE BEEN THINKING...



I WENT ON A TRIP TO EUROPE LAST YEAR AND... I LOVED IT. THERE WAS SOMETHING SPECIAL ABOUT THE PLACES I TRAVELED TO. SOMETHING BEAUTIFUL.

NEARLY A BILLION PEOPLE TRAVEL TO EUROPE EVERY YEAR, BEY. THEY ARE LARGELY ATTRACTED BY SOME OF THE WORLD'S MOST BEAUTIFUL CITIES AND LANDMARKS.



IT'S HARD TO EXPRESS, BUT THERE'S SOMETHING EXTRAORDINARY ABOUT THE PLACES I VISITED. THE ARCHITECTURE WAS PART OF IT, BUT THERE WAS MORE...

I SEE. EUROPE'S ARCHITECTURE IS INDEED CAPTIVATING, OFTEN REFLECTING CENTURIES OF HISTORY. BUT ITS CHARM EXTENDS BEYOND THAT, ENCOMPASSING CULTURE, ATMOSPHERE AND MORE.



SOME PLACES HERE ARE LESS THAN INSPIRING. WE NEED TO STEP UP OUR GAME.

UNINSPIRING PLACES ARE NOT UNIQUE TO THE UNITED STATES, BEY.



I KNOW. I GUESS I JUST FEEL LIKE THERE'S SOME ROOM FOR IMPROVEMENT HERE TO MAKE OUR CITIES LOOK BETTER.

ABSOLUTELY, BEY. BEAUTIFICATION IS A CONTINUOUS PROCESS, AND THERE IS MUCH WE CAN DO TO ENHANCE THE APPEAL OF OUR COMMUNITIES.



LET ME GUESS, MUCH IS ALREADY BEING DONE TO BEAUTIFY OUR CITIES.

YOU ARE NOTICING MY PATTERNS ALREADY.

THOUGH YES, MANY ARE ALREADY WORKING TO IMPROVE OUR CITYSCAPES.



BUT IT'S NOT LIKE WE CAN TURN BACK TIME AND REBUILD EVERYTHING...



ON THE CONTRARY. OUR OWN HISTORY AND ARCHITECTURE ARE KEY TO CREATING ATTRACTIVE AND VIBRANT CITIES. ARCHITECTS, CITY PLANNERS, AND ARTISTS LEVERAGE THOSE VALUABLE RESOURCES EVERY DAY.



I KNOW THAT AN ARCHITECT IS AN ARTIST IN THEIR OWN RIGHT, BUT THEY'VE GOT TO BE DEALING WITH A TON OF CONSTRAINTS. WITH THINGS LIKE BUDGETS AND REGULATIONS, HOW CAN THEY MAKE A MASTERPIECE?

IT IS A CHALLENGE. THESE PROFESSIONALS MAY NEED TO NEGOTIATE 'FUNCTION' WITH 'FORM', BUT THEY DO THIS BRILLIANTLY. THE MASTERPIECE IN A DESIGN ISN'T ALWAYS ABOUT LOOKS, BUT ALSO HOW IT FITS IN AND IMPROVES ITS SURROUNDINGS.



THAT'S A GOOD POINT. I AM WORRIED ABOUT HOW LONG IT WILL TAKE TO BEAUTIFY OUR CITIES WITH THOSE CHALLENGES, THOUGH.



IT IS A PROCESS, BEY. BUT REMEMBER, AESTHETICS ARE OFTEN A PRIORITY IN DESIGN. DESIGNERS STRIVE TO CREATE VISUALLY APPEALING, SUSTAINABLE, AND LIVABLE SPACES DESPITE THE OBSTACLES.

TAKE GREEN SPACES AS AN EXAMPLE. THEY ARE GAINING MORE ATTENTION AND FUNDING EACH YEAR. PARKS, GARDENS, AND PLAZAS NOT ONLY MAKE A CITY MORE BEAUTIFUL, BUT THEY IMPROVE AIR QUALITY, CREATE WILDLIFE HABITATS, AND PROVIDE RECREATIONAL AREAS FOR PEOPLE TO RELAX, EXERCISE, AND SOCIALIZE.



GREEN SPACES PLAY A CRUCIAL ROLE IN ENVIRONMENTAL DESIGN, URBAN ARCHITECTURE, AND TRANSPORTATION PLANNING. THEY ARE WIDELY ENCOURAGED FOR THEIR MANY BENEFITS.



SO IT'S NOT JUST ABOUT GREEN SPACES, RIGHT?

CORRECT, BEY. THERE ARE MANY OTHER TOOLS AND TRENDS THAT IMPROVE THE AESTHETICS OF OUR COMMUNITIES. WATER FEATURES ARE ONE SUCH EXAMPLE, AND WHEN INTEGRATED INTO DESIGN THEY CAN BE USED TO ENHANCE ENVIRONMENTAL SUSTAINABILITY.

RIVERS, LAKES, AND EVEN MAN-MADE PONDS CAN PROVIDE A FOCAL POINT IN AN URBAN LANDSCAPE, BUT ALSO SUPPORT WILDLIFE AND HELP WITH NATURAL STORMWATER MANAGEMENT.



LIGHT IS ANOTHER METHOD OF BEAUTIFYING CITIES. CREATIVE AND STRATEGIC LIGHTING NOT ONLY ENHANCES SAFETY, BUT CAN CREATE AN INVITING ATMOSPHERE AND HIGHLIGHT THE SURROUNDING ARCHITECTURE.



THERE ARE OTHER MOVEMENTS LIKE COMMUNITY GARDENING IN URBAN SPACES. THESE ARE OFTEN COLLECTIVELY GARDENED BY A GROUP OF PEOPLE, OFFERING OPPORTUNITIES FOR NEIGHBORS TO GROW THEIR OWN FOOD, CONNECT WITH NATURE, AND PROMOTE SOCIALIZATION.



GOVERNMENTS ALSO PARTNER WITH ARTISTS TO ENHANCE AN URBAN AESTHETIC THROUGH MURALS, SCULPTURES, AND EVEN GRAFFITI. PUBLIC ART IS A POWERFUL MEDIUM FOR CULTURAL EXPRESSION, COMMUNITY PRIDE, AND ECONOMIC ENRICHMENT.

WHAT ABOUT THOSE REALLY OLD BUILDINGS DOWNTOWN?



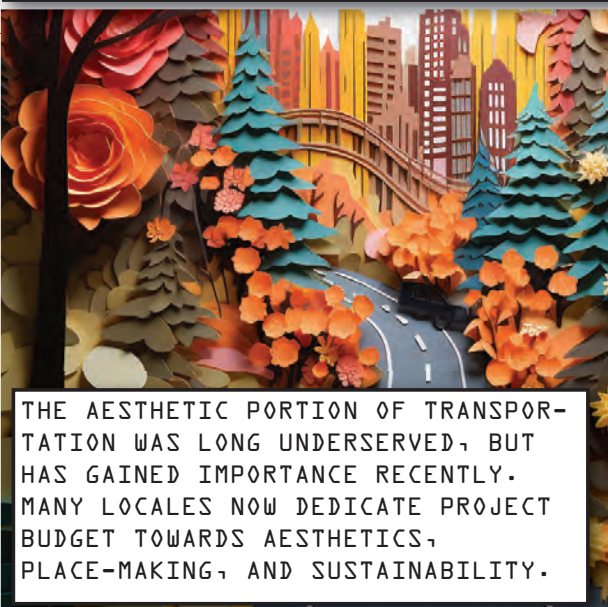
BUT WHAT ABOUT THE 'FUNCTIONAL' STUFF? IT SEEMS LIKE WE COULD MAKE THE PRETTIEST CITY IN THE WORLD, BUT IT WOULDN'T DO MUCH IF THE ROADS AND BRIDGES ARE AS UGLY AS SIN.



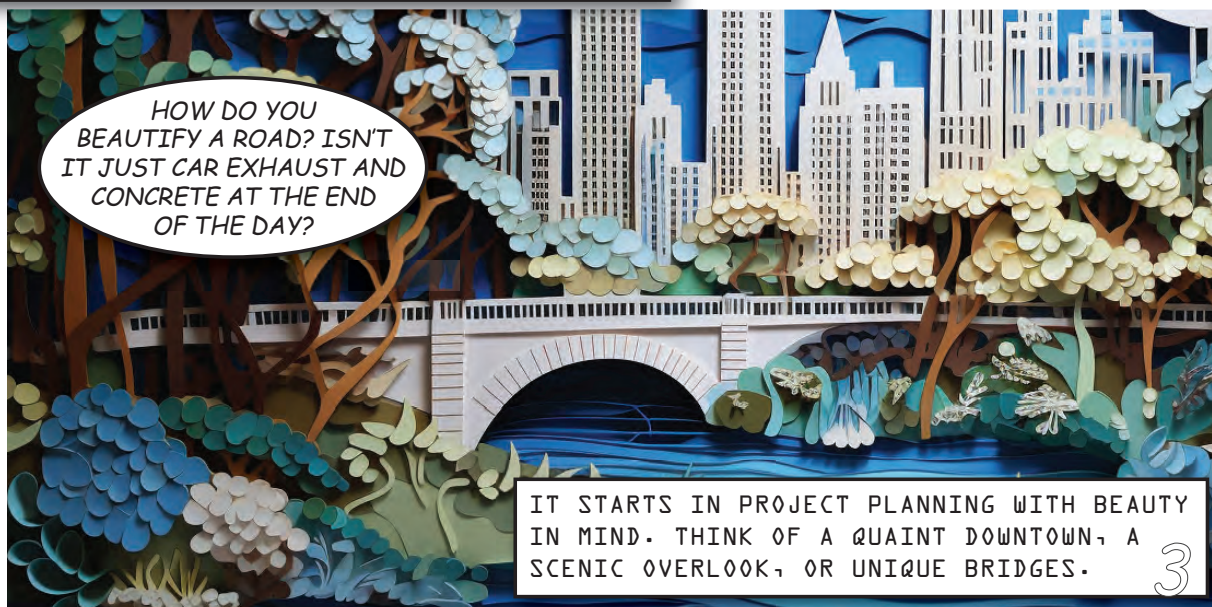
ABSOLUTELY, THAT IS AN ESSENTIAL ASPECT OF CITY BEAUTIFICATION.

HISTORIC PRESERVATION IS CRUCIAL. BY PROTECTING AND RESTORING HISTORIC SITES, WE MAINTAIN A CONNECTION TO OUR PAST. NEW TECHNOLOGIES LIKE 3D SCANNING ARE BEING USED FOR MORE ACCURATE PRESERVATION OF THESE IMPORTANT PLACES.

HOW DO YOU BEAUTIFY A ROAD? ISN'T IT JUST CAR EXHAUST AND CONCRETE AT THE END OF THE DAY?



THE AESTHETIC PORTION OF TRANSPORTATION WAS LONG UNDERSERVED, BUT HAS GAINED IMPORTANCE RECENTLY. MANY LOCALES NOW DEDICATE PROJECT BUDGET TOWARDS AESTHETICS, PLACE-MAKING, AND SUSTAINABILITY.



IT STARTS IN PROJECT PLANNING WITH BEAUTY IN MIND. THINK OF A QUAIN T DOWNTOWN, A SCENIC OVERLOOK, OR UNIQUE BRIDGES.

AND BEYOND PLANNING?

DESIGNED ELEMENTS LIKE COMPLIMENTARY COLORS AND PATTERNS FOR PAVING CAN ADD APPEAL...



... AS CAN PLANTING NATIVE TREES, SHRUBS AND FLOWERS ALONG STREETS AND HIGHWAYS.

DECORATIVE LIGHT POLES, STREET FURNITURE AND SCULPTURES ALONG A ROADWAY CAN FOSTER AN IDENTITY AND ESTABLISH A SENSE OF PLACE.

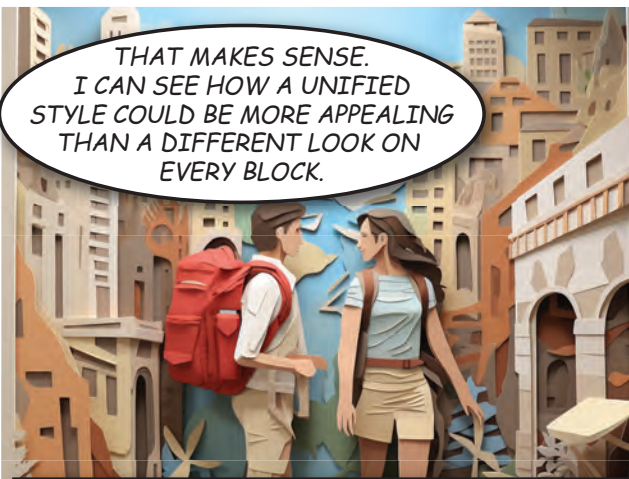


SO THE GOAL IS TO INCORPORATE ART AND DESIGN INTO NEW INFRASTRUCTURE?



PRECISELY. AND MANY OF THESE ORGANIZATIONS DEVELOP CONSISTENT 'STREETScape' STANDARDS SO THAT THE LANDSCAPE OF ONE PROJECT WILL COMPLEMENT THE NEXT.

THAT MAKES SENSE. I CAN SEE HOW A UNIFIED STYLE COULD BE MORE APPEALING THAN A DIFFERENT LOOK ON EVERY BLOCK.



SO SPENDING MONEY ON BEAUTIFICATION ISN'T JUST FOR SHOW, IT CAN ACTUALLY BE A GOOD RETURN ON INVESTMENT?



INDEED. AND BESIDES DIRECTLY BENEFITING THE CITY'S RESIDENTS, AESTHETIC INVESTMENTS CAN ALSO BOOST THE LOCAL ECONOMY BY ATTRACTING TOURISM.

CORRECT. REMEMBER EUROPE'S BEAUTY AND THRIVING TOURISM. WOULD YOU PREFER VACATIONING IN A VIBRANT CITY, OR A NEGLECTED ONE?

MOST PEOPLE WOULD AGREE. BEAUTIFICATION INVESTMENTS NOT ONLY PROVIDE TANGIBLE BENEFITS LIKE ECONOMIC GROWTH AND SAFETY, BUT THEY ALSO ENHANCE QUALITY OF LIFE, HIGHLIGHT HISTORY AND CULTURE, AND ENRICH COMMUNITY PRIDE AND COHESION.



THE VIBRANT ONE, OBVIOUSLY.

WHAT CAN I DO TO HELP? I'M GUESSING IT HAS SOMETHING TO DO WITH GETTING INVOLVED IN MY LOCAL COMMUNITY.



THAT'S A GOOD START. YOU CAN LEARN ABOUT UPCOMING PROJECTS AND ATTEND PUBLIC MEETINGS LOOKING FOR COMMUNITY FEEDBACK.



YOU CAN ALSO PARTICIPATE IN LOCAL INITIATIVES LIKE CLEAN-UP DRIVES, COMMUNITY GARDENING, AND TREE PLANTING.



EVEN PUBLIC ART INSTALLATIONS CAN USE AN EXTRA HAND.



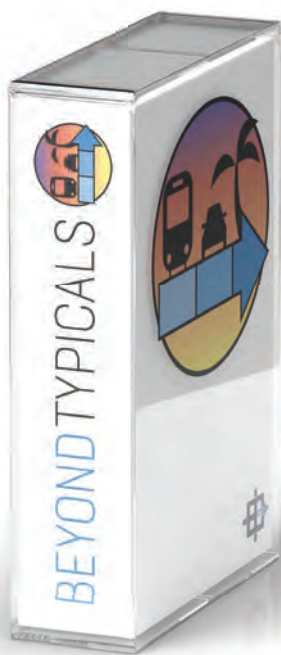
WELL, I'M RELIEVED TO KNOW SO MANY PEOPLE ARE ACTIVELY WORKING TO BEAUTIFY OUR WORLD. THERE'S A LOT TO DO, BUT WE'RE ON THE RIGHT TRACK.

ME TOO.



AND I CAN'T WAIT TO GET INVOLVED AND CONTRIBUTE TO THE CAUSE!

DON'T GET AHEAD OF YOURSELF, YOU'RE JUST A PAIR OF SUNGLASSES.



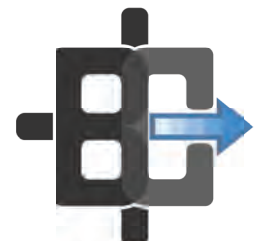
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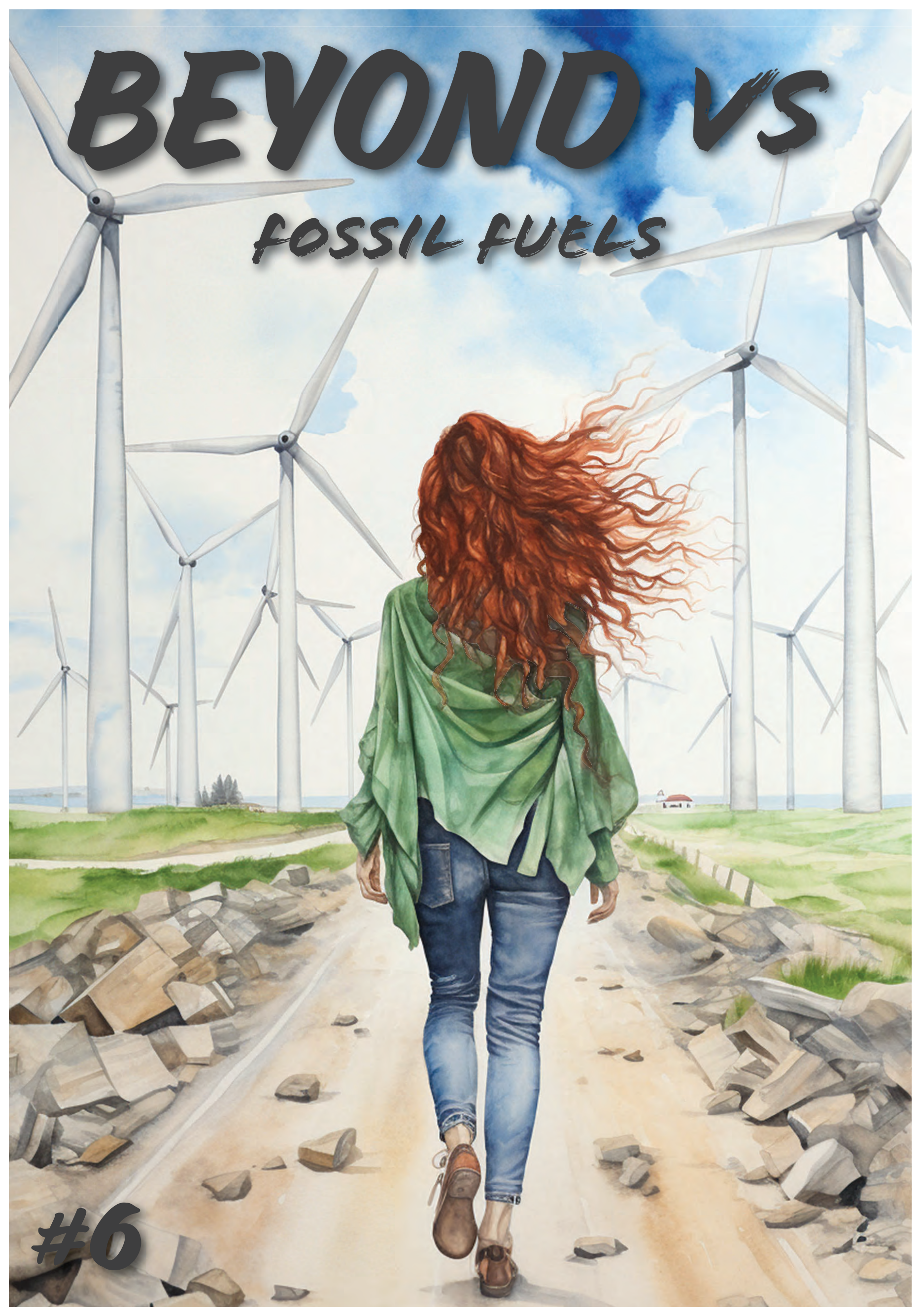
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FOSSIL FUELS



#6

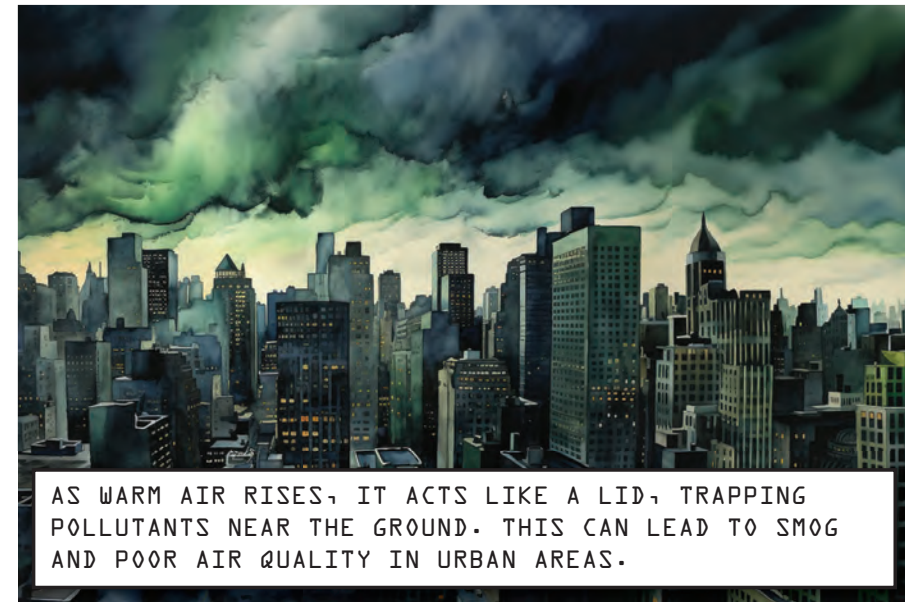


WOW, IT'S SO SMOGGY TODAY, OND. IS IT ALWAYS THIS BAD?



ACCORDING TO LOCAL NEWS REPORTS, WE ARE EXPERIENCING A TEMPERATURE INVERSION, BEY.

WHAT'S THAT?

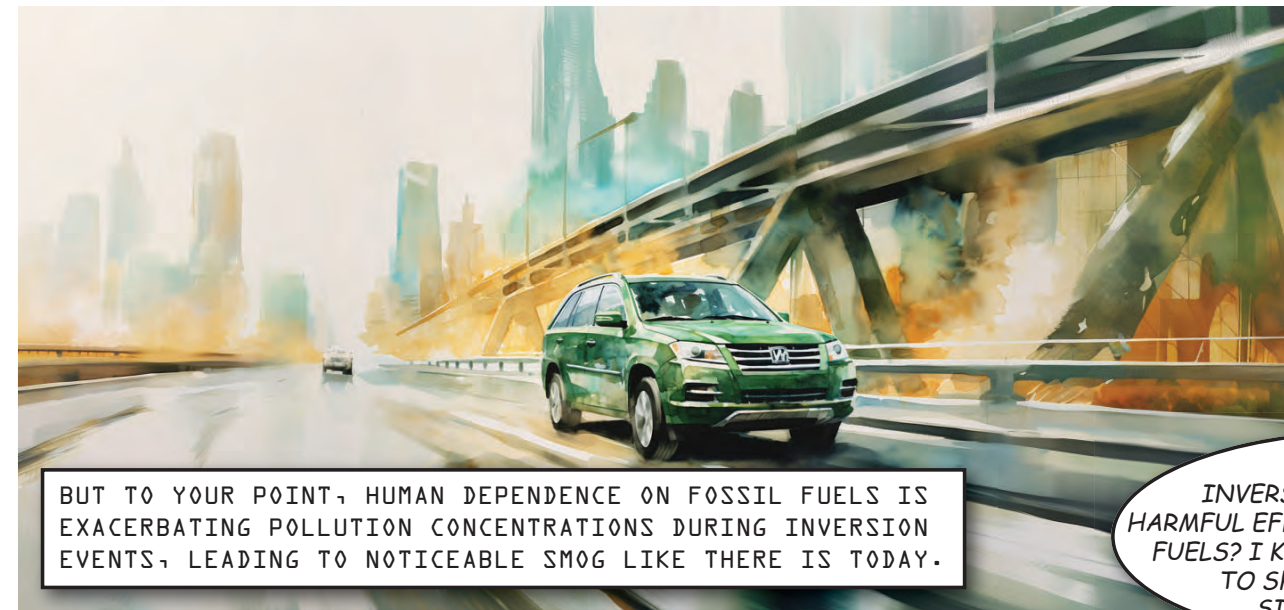


AS WARM AIR RISES, IT ACTS LIKE A LID, TRAPPING POLLUTANTS NEAR THE GROUND. THIS CAN LEAD TO SMOG AND POOR AIR QUALITY IN URBAN AREAS.



SO IF PEOPLE WEREN'T POLLUTING THE WORLD, WE WOULDN'T HAVE INVERSIONS LIKE THIS?

NOT EXACTLY. INVERSIONS ARE NATURAL EVENTS, AS ARE WILDFIRES AND VOLCANIC ERUPTIONS WHICH CAUSE SIGNIFICANT AIR POLLUTION. POOR AIR QUALITY HAS OCCURRED LONG BEFORE CITIES EMERGED.



BUT TO YOUR POINT, HUMAN DEPENDENCE ON FOSSIL FUELS IS EXACERBATING POLLUTION CONCENTRATIONS DURING INVERSION EVENTS, LEADING TO NOTICEABLE SMOG LIKE THERE IS TODAY.



ASIDE FROM INVERSIONS, WHAT OTHER HARMFUL EFFECTS COME FROM FOSSIL FUELS? I KNOW YOU ARE ANXIOUS TO SHARE ONE OF YOUR SIGNATURE LISTS.

YOU KNOW ME TOO WELL.

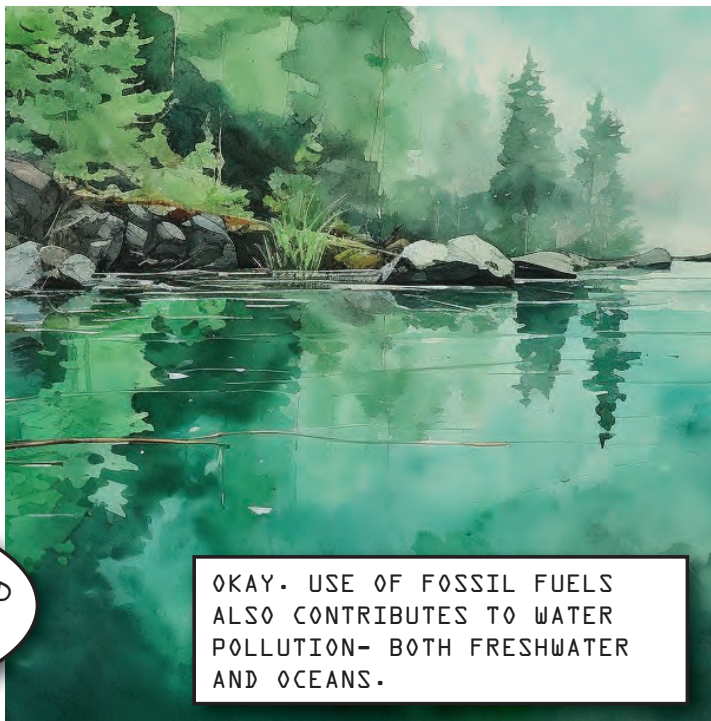


BURNING FOSSIL FUELS FOR ELECTRICITY, HEAT, TRANSPORTATION AND OTHER USES LEADS TO ACID RAIN AND SMOG, WHICH AFFECT THE HEALTH OF HUMANS AND ANIMALS.

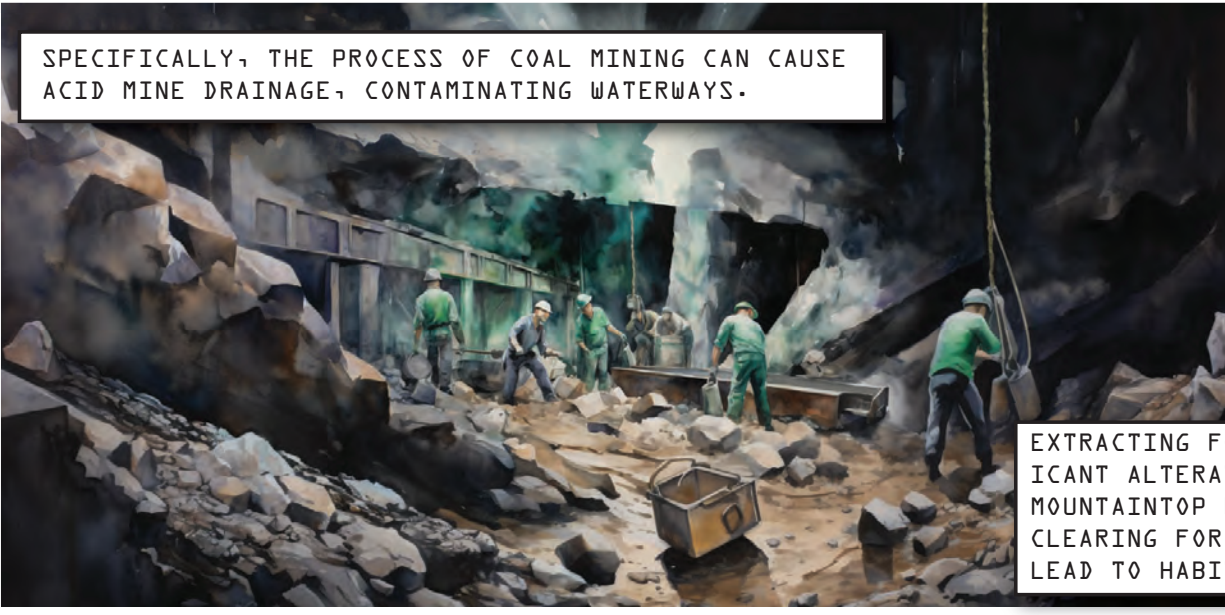


THEN THERE'S THE GREENHOUSE EFFECT. BURNING FOSSIL FUELS RELEASES SIGNIFICANT AMOUNTS OF CARBON DIOXIDE, METHANE, AND NITROUS OXIDE. THESE ARE GREENHOUSE GASSES THAT TRAP HEAT IN THE EARTH'S ATMOSPHERE, LEADING TO GLOBAL WARMING AND CLIMATE CHANGE.

I IMAGINE CLIMATE CHANGE IS A WHOLE OTHER CAN OF WORMS. LET'S STAY FOCUSED ON FOSSIL FUELS FOR NOW AND LEAVE THE CLIMATE ISSUE FOR ANOTHER DAY



OKAY. USE OF FOSSIL FUELS ALSO CONTRIBUTES TO WATER POLLUTION- BOTH FRESHWATER AND OCEANS.



SPECIFICALLY, THE PROCESS OF COAL MINING CAN CAUSE ACID MINE DRAINAGE, CONTAMINATING WATERWAYS.



EXTRACTING FOSSIL FUELS OFTEN REQUIRES SIGNIFICANT ALTERATIONS TO THE ENVIRONMENT, SUCH AS MOUNTAINTOP REMOVAL FOR COAL MINING, OR LAND CLEARING FOR OIL AND GAS DRILLING. THIS CAN LEAD TO HABITAT DESTRUCTION AND FRAGMENTATION.



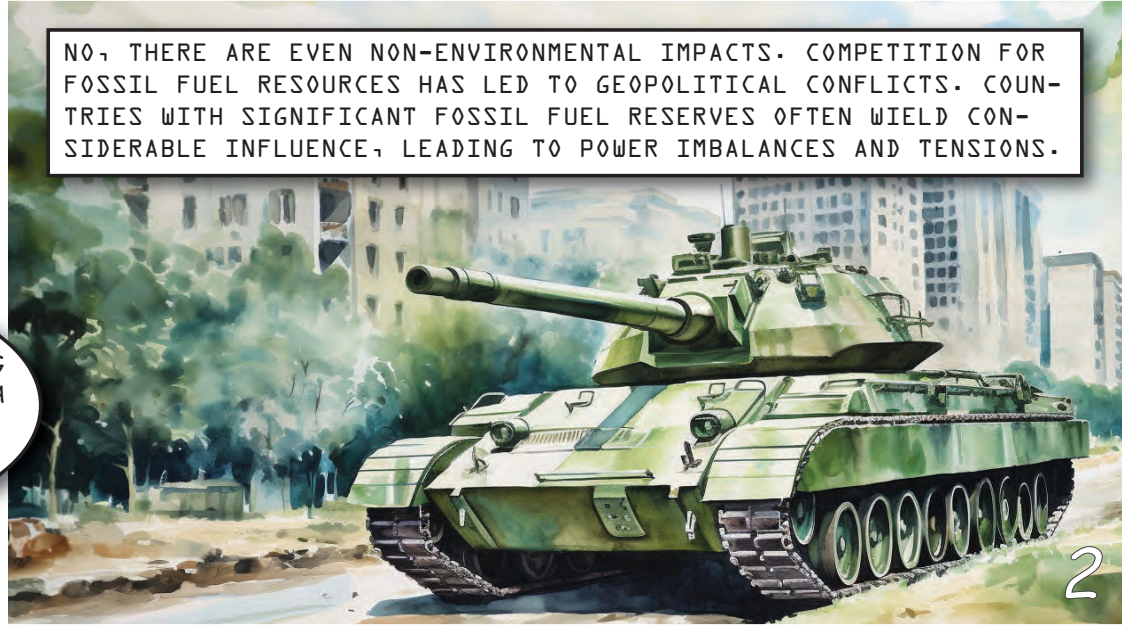
FOSSIL FUEL-DERIVED PLASTICS ARE NOT BIODEGRADABLE. THEY OVERFLOW IN LANDFILLS...



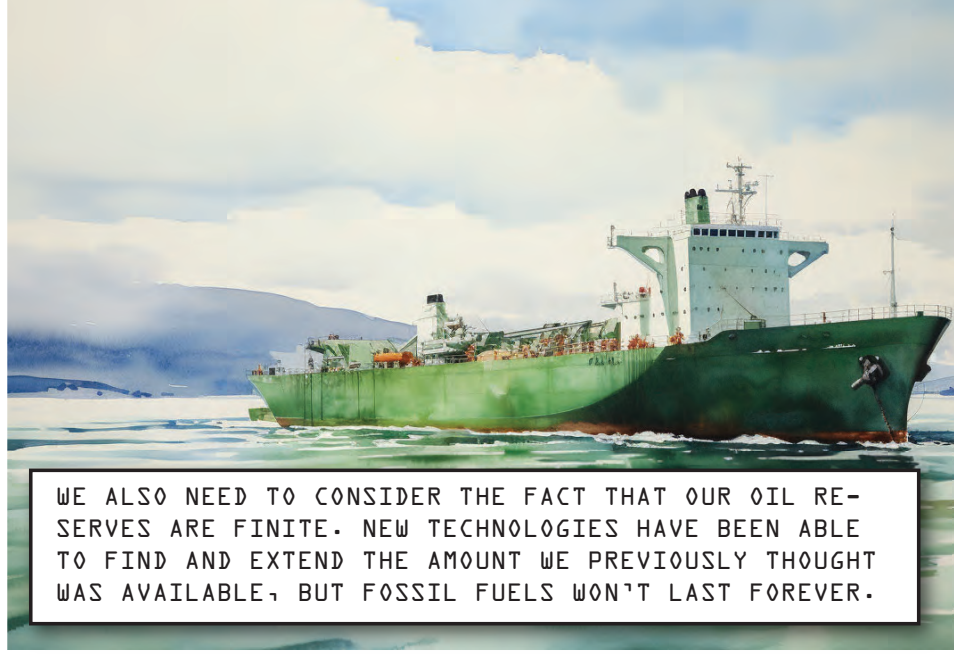
...AND HARM MARINE LIFE.



JUST... GROSS. IS THAT ALL? YOU ARE MAKING ME NEVER WANT TO DRIVE A GAS-POWERED VEHICLE OR USE A PLASTIC PRODUCT EVER AGAIN.



NO, THERE ARE EVEN NON-ENVIRONMENTAL IMPACTS. COMPETITION FOR FOSSIL FUEL RESOURCES HAS LED TO GEOPOLITICAL CONFLICTS. COUNTRIES WITH SIGNIFICANT FOSSIL FUEL RESERVES OFTEN WIELD CONSIDERABLE INFLUENCE, LEADING TO POWER IMBALANCES AND TENSIONS.



RELIANCE ON FOSSIL FUELS ALSO LEADS TO ECONOMIC VOLATILITY AND HARDSHIPS, ESPECIALLY ON COUNTRIES THAT RELY ON OIL EXPORTS.

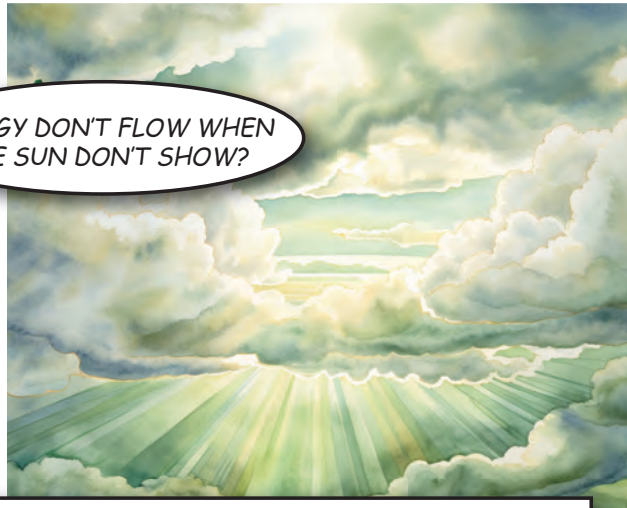
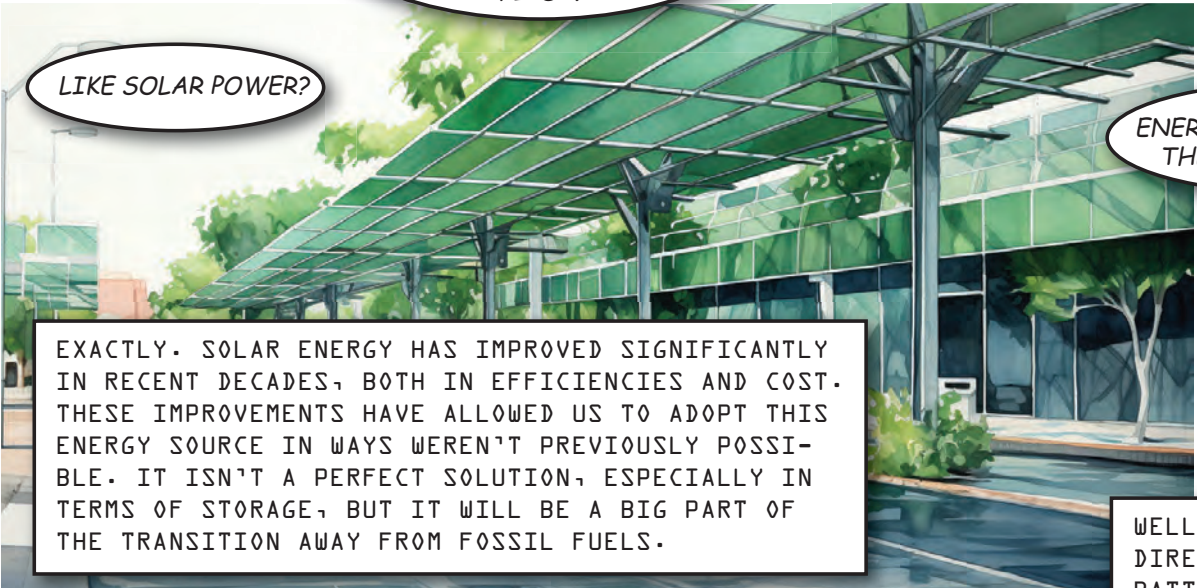
WE ALSO NEED TO CONSIDER THE FACT THAT OUR OIL RESERVES ARE FINITE. NEW TECHNOLOGIES HAVE BEEN ABLE TO FIND AND EXTEND THE AMOUNT WE PREVIOUSLY THOUGHT WAS AVAILABLE, BUT FOSSIL FUELS WON'T LAST FOREVER.



BEYOND, OUR MODERN WORLD WAS LARGELY BUILT ON FOSSIL FUELS. THEY'VE DRIVEN PROGRESS AND INNOVATIONS FOR THE PAST TWO CENTURIES. HOWEVER, THESE SAME INNOVATIONS NOW GIVE US THE TOOLS TO SHIFT TOWARDS MORE SUSTAINABLE ENERGY SOURCES.

SO... WHAT DO WE DO? IT SEEMS LIKE WE ARE EITHER GOING TO COMPLETELY RUIN OUR ENVIRONMENT BY BURNING FOSSIL FUELS OR COMPLETELY RUIN OUR ECONOMY WHEN WE RUN OUT- WHICHEVER COMES FIRST.

LIKE SOLAR POWER?

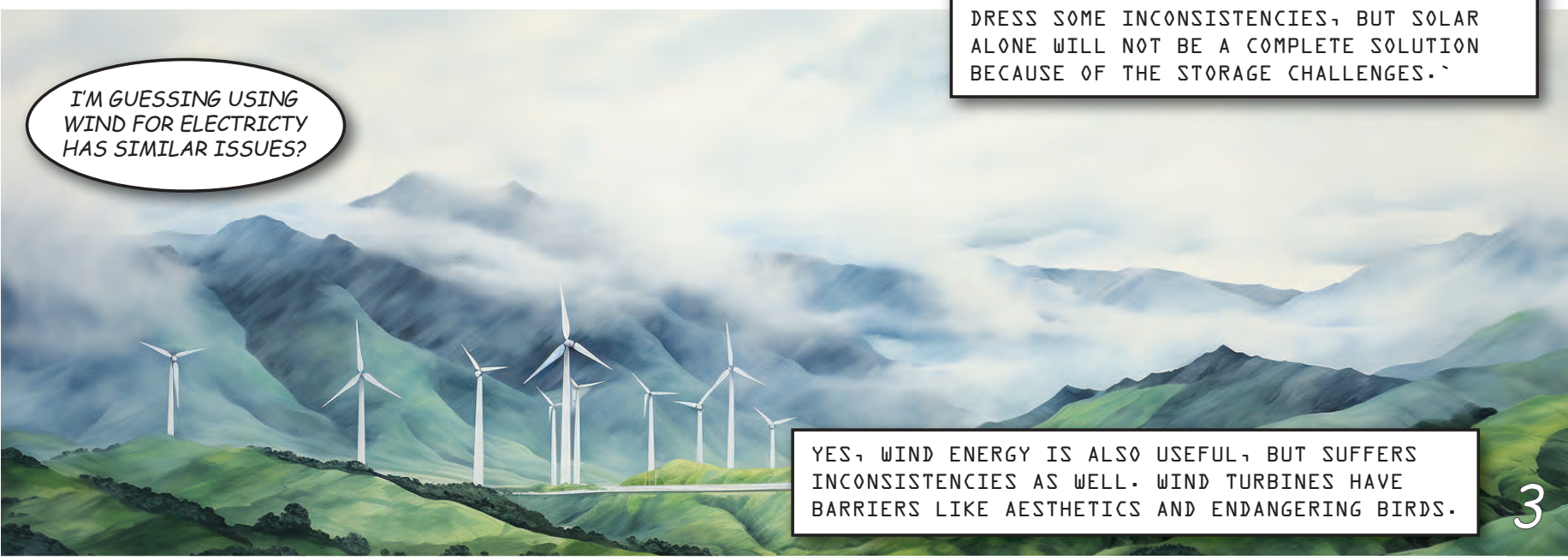


ENERGY DON'T FLOW WHEN THE SUN DON'T SHOW?

EXACTLY. SOLAR ENERGY HAS IMPROVED SIGNIFICANTLY IN RECENT DECADES, BOTH IN EFFICIENCIES AND COST. THESE IMPROVEMENTS HAVE ALLOWED US TO ADOPT THIS ENERGY SOURCE IN WAYS WEREN'T PREVIOUSLY POSSIBLE. IT ISN'T A PERFECT SOLUTION, ESPECIALLY IN TERMS OF STORAGE, BUT IT WILL BE A BIG PART OF THE TRANSITION AWAY FROM FOSSIL FUELS.

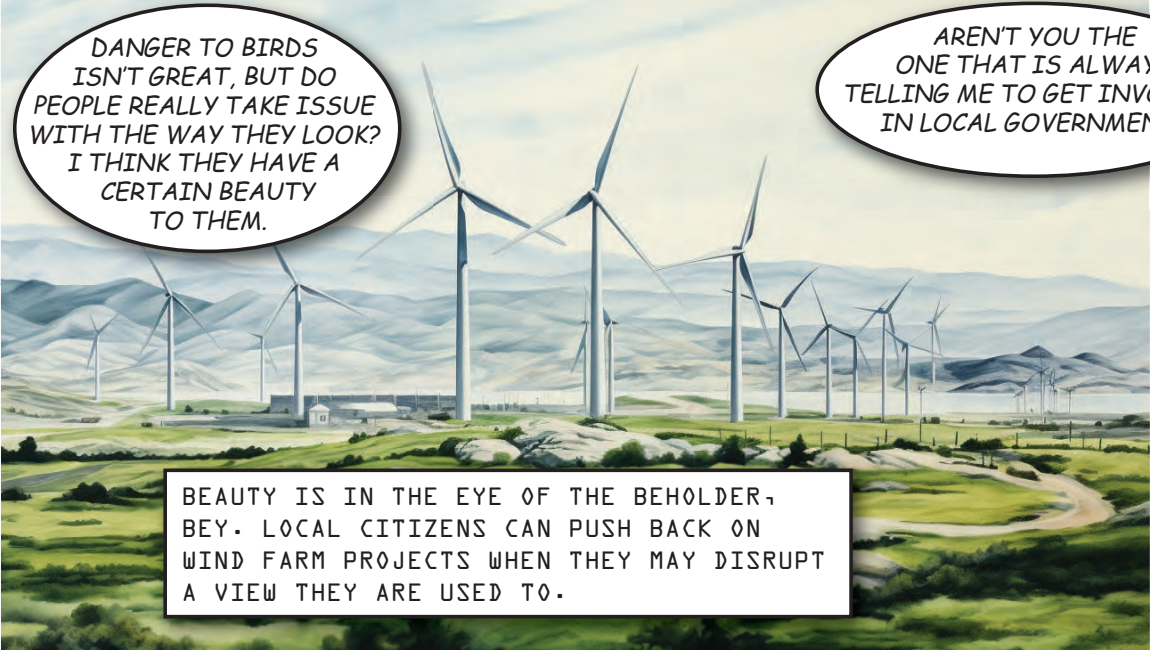
WELL PUT. SOLAR PANELS RELY HEAVILY ON DIRECT SUNLIGHT FOR OPTIMAL PERFORMANCE. BATTERIES ARE IMPROVING AND MAY HELP ADDRESS SOME INCONSISTENCIES, BUT SOLAR ALONE WILL NOT BE A COMPLETE SOLUTION BECAUSE OF THE STORAGE CHALLENGES.

I'M GUESSING USING WIND FOR ELECTRICITY HAS SIMILAR ISSUES?



YES, WIND ENERGY IS ALSO USEFUL, BUT SUFFERS INCONSISTENCIES AS WELL. WIND TURBINES HAVE BARRIERS LIKE AESTHETICS AND ENDANGERING BIRDS.

DANGER TO BIRDS ISN'T GREAT, BUT DO PEOPLE REALLY TAKE ISSUE WITH THE WAY THEY LOOK? I THINK THEY HAVE A CERTAIN BEAUTY TO THEM.



AREN'T YOU THE ONE THAT IS ALWAYS TELLING ME TO GET INVOLVED IN LOCAL GOVERNMENT?

EVERYONE DESERVES A VOICE, BEY. EVEN IF YOU DON'T AGREE WITH THEM.



BEAUTY IS IN THE EYE OF THE BEHOLDER, BEY. LOCAL CITIZENS CAN PUSH BACK ON WIND FARM PROJECTS WHEN THEY MAY DISRUPT A VIEW THEY ARE USED TO.

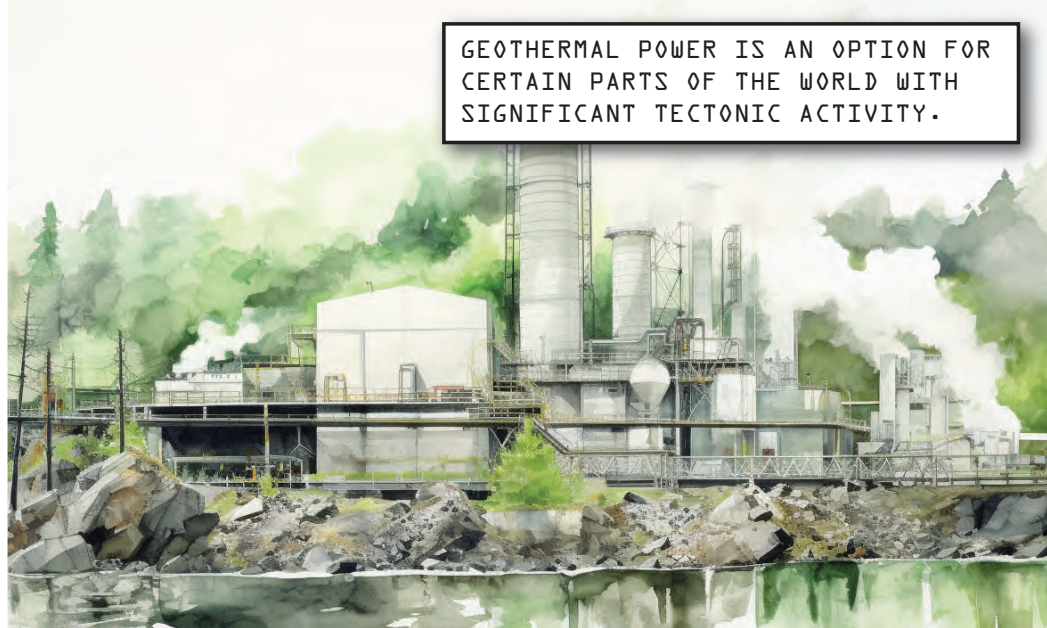
AGREE TO DISAGREE.

OKAY, SO LET'S CRANK UP THE SOLAR AND WIND. WHAT OTHER FORMS OF RENEWABLE ENERGIES CAN HELP US MOVE AWAY FROM FOSSIL FUELS?

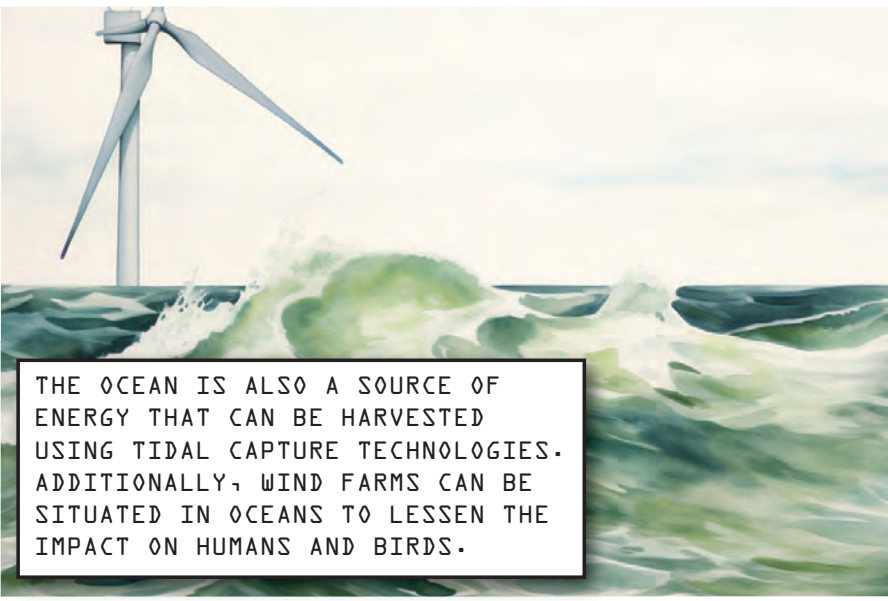


HYDROELECTRIC IS ONE OF THE BEST AND MOST RELIABLE, THOUGH MOST OF THE POTENTIAL SITES HAVE ALREADY BEEN TAPPED.

GEOTHERMAL POWER IS AN OPTION FOR CERTAIN PARTS OF THE WORLD WITH SIGNIFICANT TECTONIC ACTIVITY.



THERE IS BIOMASS ENERGY. SOME OF THESE EMERGING TECHNOLOGIES CAN EVEN TAP INTO LANDFILLS TO CAPTURE METHANE RELEASES.



THE OCEAN IS ALSO A SOURCE OF ENERGY THAT CAN BE HARVESTED USING TIDAL CAPTURE TECHNOLOGIES. ADDITIONALLY, WIND FARMS CAN BE SITUATED IN OCEANS TO LESSEN THE IMPACT ON HUMANS AND BIRDS.



THAT'S A LOT OF OPTIONS, BUT IT SOUNDS LIKE THEY ALL HAVE DOWNSIDES, AND THERE ISN'T ONE THAT COULD SINGLE-HANDEDLY REPLACE FOSSIL FUELS.

CORRECT, BUT IT DOESN'T HAVE TO BE JUST ONE OF THESE RENEWABLE SOLUTIONS. A NON-FOSSIL FUEL FUTURE WILL LOOK LIKE A BLEND OF ALL OF THEM.



THINK OF A PIE CHART WITH MULTIPLE SECTIONS, EACH REPRESENTING A SOURCE OF ENERGY THAT ADDS UP TO A MORE RENEWABLE FUTURE. SOME PLACES WILL RELY MORE HEAVILY ON ONE SOURCE THAN ANOTHER, AND THE CHART WILL LOOK DIFFERENT WHEREVER YOU GO. IT IS ALSO GOOD TO REMEMBER THAT SOME FOSSIL FUELS MAY ALWAYS TAKE UP A PORTION OF THAT CHART, EVEN IF THAT PIECE SHRINKS OVER TIME.



CITIES ARE ALSO MAKING SUSTAINABILITY A MAJOR PART OF THEIR TRANSPORTATION PLANS, REDUCING THE RELIANCE ON CARS AND INTEGRATING RECYCLED OR LOWER IMPACT MATERIALS FOR CONSTRUCTION.

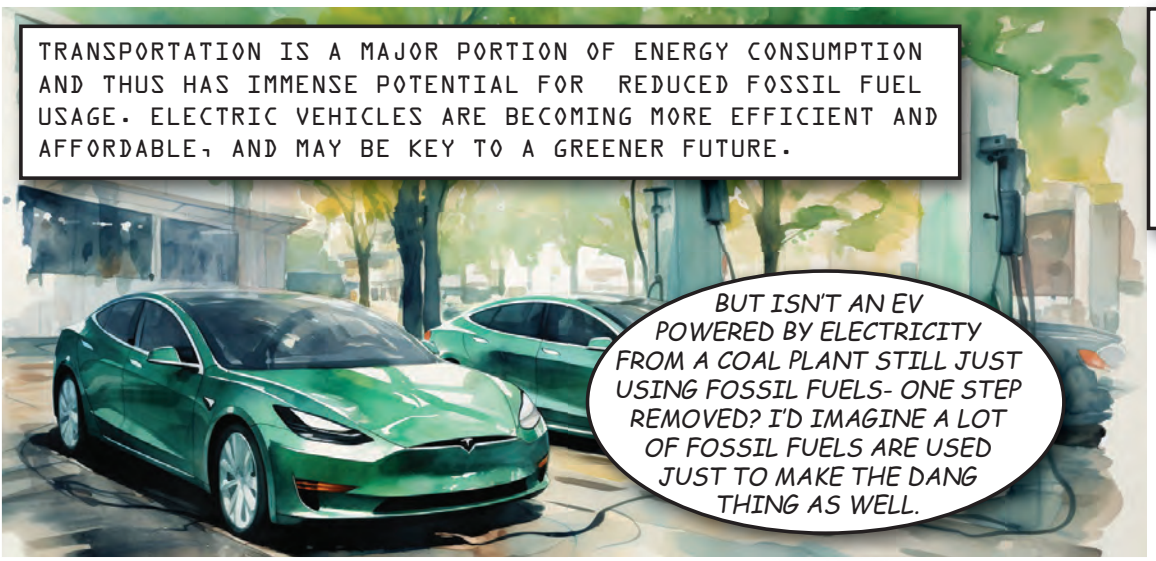


MOVING AWAY FROM FOSSIL FUELS REQUIRES THE EXPERTISE OF MANY FIELDS, NOT JUST ENERGY EXPERTS. ARCHITECTS NOW DESIGN MORE ENERGY-EFFICIENT BUILDINGS WITH A SMALLER CARBON FOOTPRINT.



I'VE NEVER THOUGHT ABOUT IT, BUT IT SEEMS LIKE ANYTHING COULD BE MADE MORE EFFICIENT AND LESS RELIANT ON FOSSIL FUELS.

INDEED, MANY MORE THINGS THAN ONE MAY NORMALLY THINK OF.




TRANSPORTATION IS A MAJOR PORTION OF ENERGY CONSUMPTION AND THUS HAS IMMENSE POTENTIAL FOR REDUCED FOSSIL FUEL USAGE. ELECTRIC VEHICLES ARE BECOMING MORE EFFICIENT AND AFFORDABLE, AND MAY BE KEY TO A GREENER FUTURE.

BUT ISN'T AN EV POWERED BY ELECTRICITY FROM A COAL PLANT STILL JUST USING FOSSIL FUELS- ONE STEP REMOVED? I'D IMAGINE A LOT OF FOSSIL FUELS ARE USED JUST TO MAKE THE DANG THING AS WELL.


GREAT POINTS, AND THAT MAY BE THE CASE TODAY, BUT AS MORE OF THAT PIE CHART IS RENEWABLE ENERGIES, EVS WILL BE CRITICAL TO SHRINKING THE FOSSIL FUEL PORTION. ADDITIONAL TECHNOLOGICAL ADVANCEMENT MAY EVEN LEAD TO SOLAR-POWERED VEHICLES.





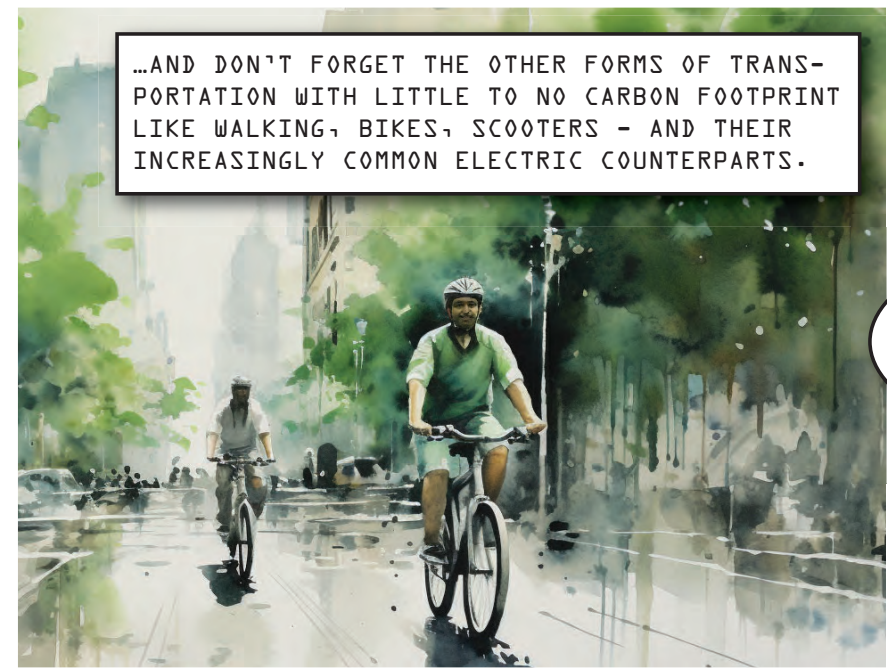
I HAVE A FEELING OUR OLD FRIEND PUBLIC TRANSPORTATION MIGHT BE PART OF THE SOLUTION, TOO.

VERY GOOD, BEY. BECAUSE PUBLIC TRANSPORTATION CAN CARRY SO MANY MORE PEOPLE THAN PERSONAL VEHICLES, THEY ARE INHERENTLY MORE EFFICIENT. MOVING PEOPLE FROM CARS TO TRAMS, SUBWAYS, AND BUSES WOULD ALSO REQUIRE LESS PAVEMENT, WHICH NEEDS A SIGNIFICANT AMOUNT OF OIL TO BUILD.




I BET THESE BUSES AND TRAINS CAN BE EVEN MORE EFFICIENT IF THEY ARE USING RENEWABLE ENERGIES.

ABSOLUTELY.




...AND DON'T FORGET THE OTHER FORMS OF TRANSPORTATION WITH LITTLE TO NO CARBON FOOTPRINT LIKE WALKING, BIKES, SCOOTERS - AND THEIR INCREASINGLY COMMON ELECTRIC COUNTERPARTS.



I SWEAR IF I EVER PLAY A TRIVIA GAME WITH YOU, I'M ALWAYS GOING TO GUESS PUBLIC AND ALTERNATIVE FORMS OF TRANSPORTATION.

ISN'T THAT WHAT WE DO EVERYDAY?

BASICALLY...



SO WHAT ELSE IS ON YOUR LIST OF HOW ORDINARY CITIZENS CAN MOVE AWAY FROM FOSSIL FUELS?

REMEMBER THE WISDOM IN THE SAYING 'REDUCE, REUSE AND RECYCLE' IN ALL THAT YOU DO. YOU CAN BRING REUSABLE BAGS TO THE GROCERY TO AVOID UNNECESSARY USE OF PLASTIC.



BUYING LOCAL ALSO REDUCES YOUR CARBON FOOTPRINT BY REDUCING THE DISTANCE FOOD AND OTHER GOODS ARE REQUIRED TO TRAVEL.



YOU CAN ALSO TURN OFF DEVICES WHEN THEY AREN'T IN USE AND REPLACE LIGHTS AND OTHER APPLIANCES IN YOUR HOME WITH MORE EFFICIENT COUNTERPARTS.



REDUCE AIR TRAVEL AND OTHER ENERGY-INEFFICIENT FORMS OF TRANSPORTATION LIKE SINGLE-OCCUPANCY VEHICLES.



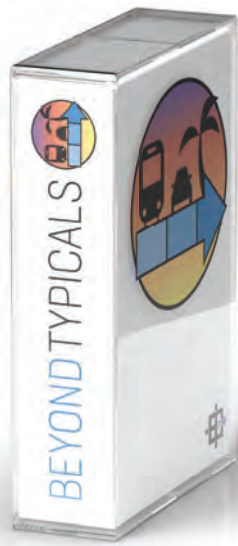
THIS IS AN INCOMPLETE LIST, BUT HOPEFULLY A GOOD START. GETTING INFORMED AND SPREADING THE MESSAGE WILL ALSO AMPLIFY THE GOOD YOU DO TO REDUCE OUR RELIANCE ON FOSSIL FUELS. THIS TRANSITION WON'T HAPPEN OVERNIGHT.



YOU MAKE IT SOUND SO EASY.

WOULD YOU LIKE ME TO MAKE IT SOUND MORE DIFFICULT?

NO, LET'S START WITH EASY. NOW LET'S GO GET SOME PIE.



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WRITTEN BY: SAM LYTLE, PE
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BEYOND VS

CLIMATE CHANGE



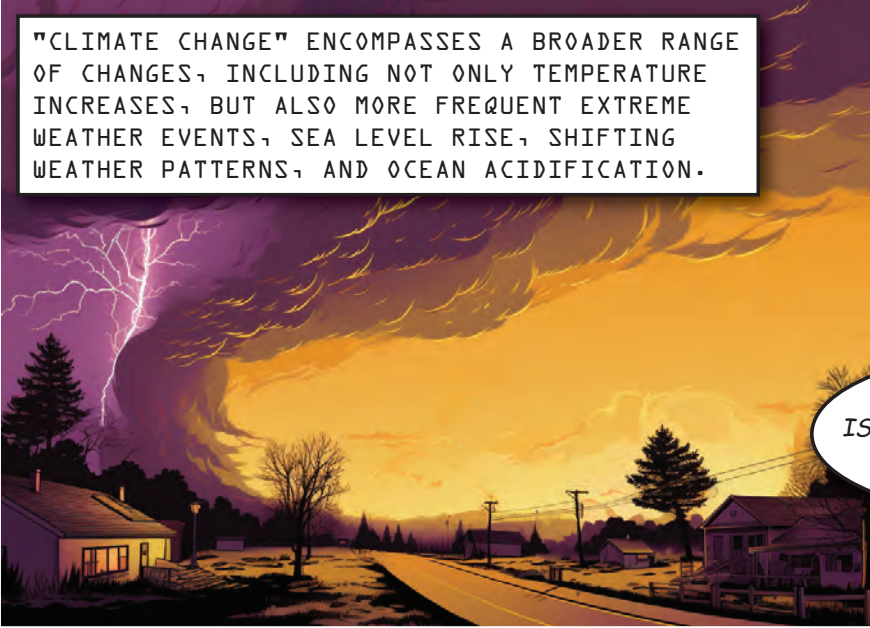
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OKAY, OND, WE'VE TALKED ABOUT FOSSIL FUELS, BUT WHAT'S THE DEAL WITH CLIMATE CHANGE? IS THAT THE SAME THING AS GLOBAL WARMING?



WELL, BEY, "GLOBAL WARMING" SPECIFICALLY REFERS TO RISING SURFACE TEMPERATURES CAUSED FROM GREENHOUSE GASSES. WHILE THIS IS A MAJOR SYMPTOM OF THE CURRENT ENVIRONMENTAL CRISIS, IT DOESN'T CAPTURE THE FULL SPECTRUM OF CHANGES.



"CLIMATE CHANGE" ENCOMPASSES A BROADER RANGE OF CHANGES, INCLUDING NOT ONLY TEMPERATURE INCREASES, BUT ALSO MORE FREQUENT EXTREME WEATHER EVENTS, SEA LEVEL RISE, SHIFTING WEATHER PATTERNS, AND OCEAN ACIDIFICATION.



SO "GLOBAL WARMING" IS ACCURATE, BUT "CLIMATE CHANGE" COVERS ALL THE BASES?


CORRECT.



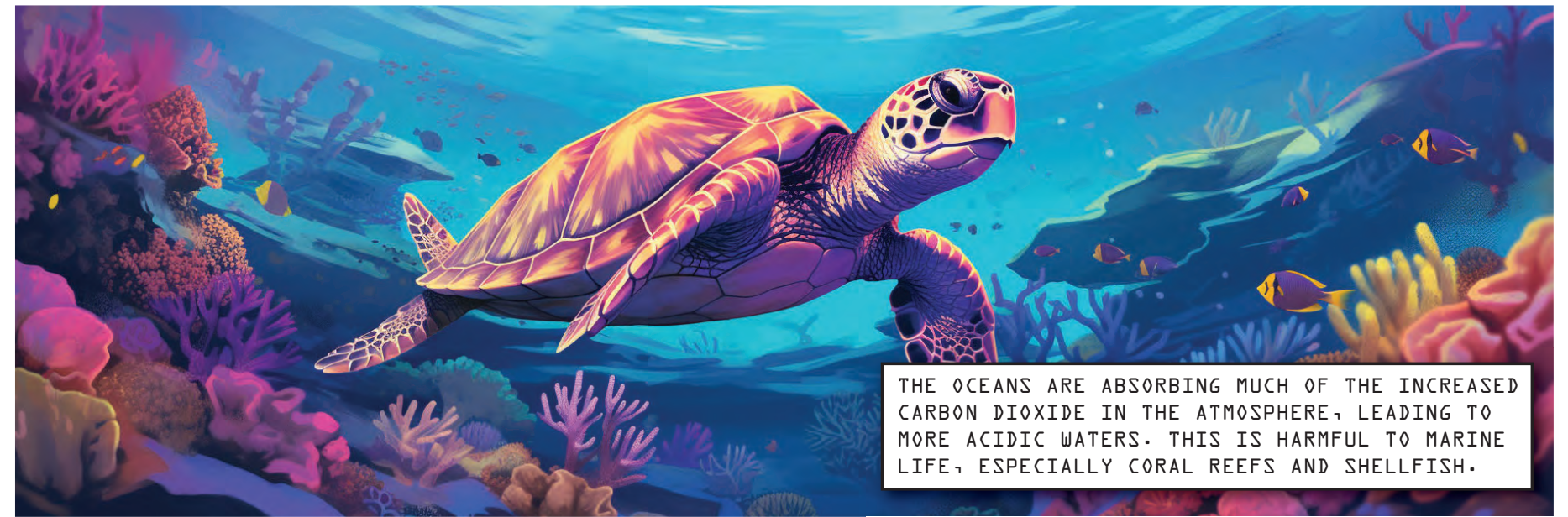
AND THAT MEANS EVEN THOUGH TEMPERATURES ARE RISING, SOME PLACES COULD HAVE RECORD SNOW BECAUSE THERE IS SO MUCH VARIATION IN CLIMATE.

VERY GOOD. SOMEONE HAS BEEN DOING THEIR HOMEWORK.


MAYBE...



SO I KNOW ABOUT THE MELTING GLACIERS AND RISING SEA LEVELS, AND HOW THAT COULD AFFECT POLAR BEARS, COASTAL CITIES AND OTHER SIMILAR EFFECTS, BUT WHAT ELSE SHOULD WE BE WORRIED ABOUT?




THE OCEANS ARE ABSORBING MUCH OF THE INCREASED CARBON DIOXIDE IN THE ATMOSPHERE, LEADING TO MORE ACIDIC WATERS. THIS IS HARMFUL TO MARINE LIFE, ESPECIALLY CORAL REEFS AND SHELLFISH.




LAND ANIMALS ALSO SUFFER. MANY SPECIES CAN'T ADAPT QUICKLY ENOUGH TO THE CHANGING CLIMATE, LEADING TO POPULATION DECLINE OR EXTINCTION. FOR EXAMPLE, CERTAIN SPECIES OF TREES, INSECTS, AND ANIMALS MAY BE DRIVEN OUT OF THEIR TRADITIONAL HABITATS.



THAT'S HEARTBREAKING. I HAVE A SOFT SPOT FOR ANIMALS.

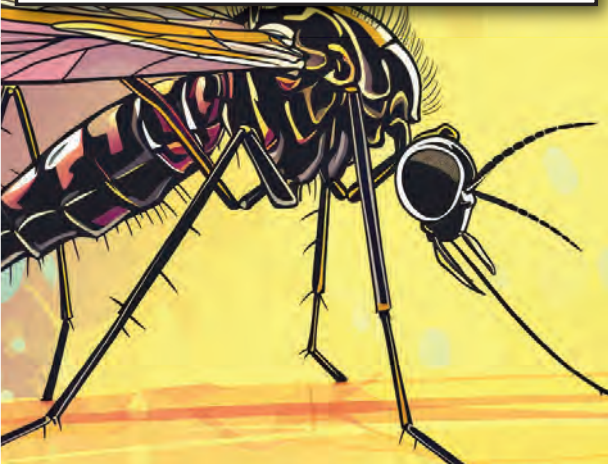


I KNOW, BEY. WHILE ACTIVISTS WORK TO SAVE ENDANGERED SPECIES, CHANGES TO THE CLIMATE MAY BE MORE SEVERE THAN CAN BE MITIGATED BY INDIVIDUALS AND ORGANIZATIONS FOCUSED ON PROTECTING WILDLIFE.

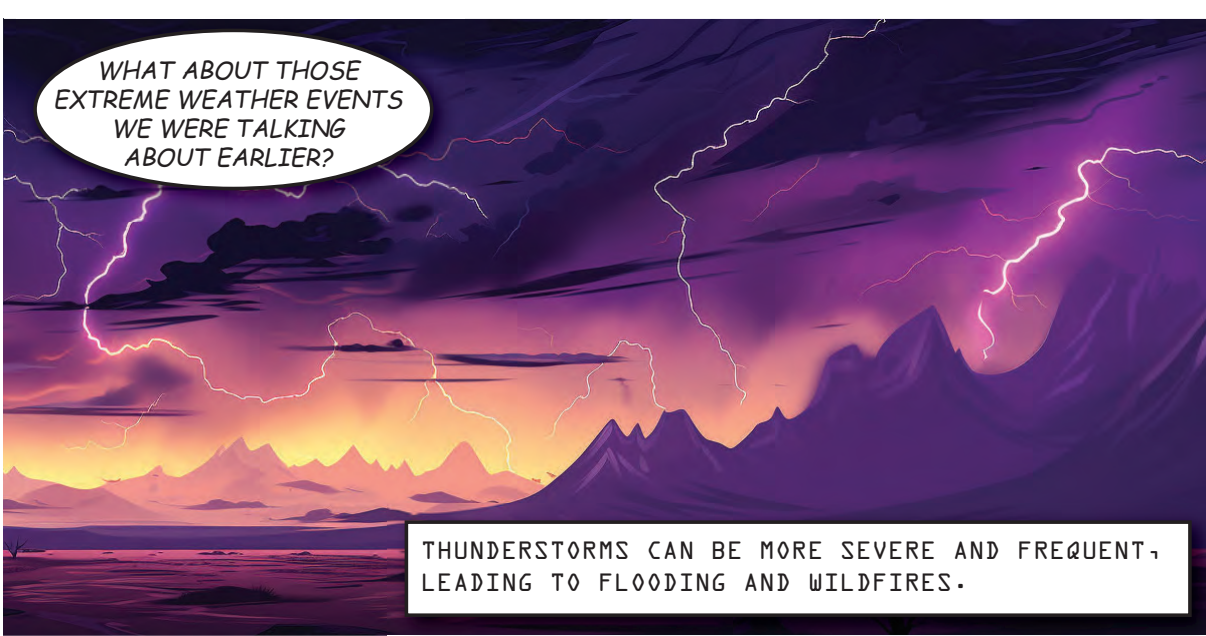


AND IT IS NOT JUST ANIMALS. CLIMATE CHANGE THREATENS FOOD SECURITY, AS CROPS SENSITIVE TO TEMPERATURE AND WATER CHANGES BECOME LESS VIABLE.

HEALTH RISKS ALSO INCREASE WITH MORE HEAT-RELATED ILLNESSES, AND VECTOR-BORNE DISEASES LIKE MALARIA AND DENGUE EXPANDING TO NEW AREAS.



WHAT ABOUT THOSE EXTREME WEATHER EVENTS WE WERE TALKING ABOUT EARLIER?

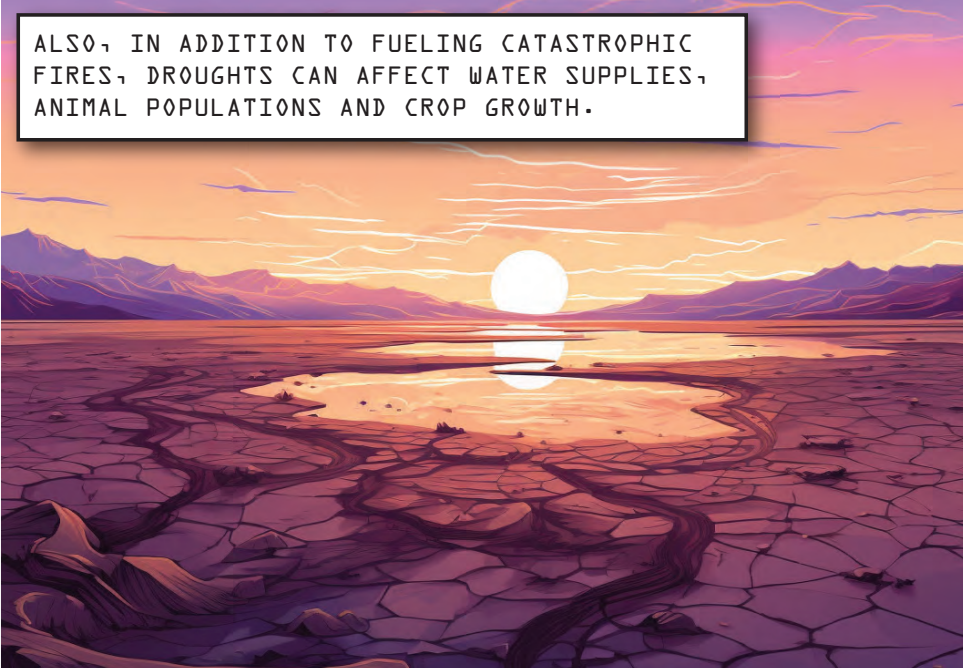


THUNDERSTORMS CAN BE MORE SEVERE AND FREQUENT, LEADING TO FLOODING AND WILDFIRES.

WILDFIRES - CAUSED BY HUMANS OR NATURE - CAN BE MORE DEVASTATING DUE TO EXTENDED DROUGHTS.



ALSO, IN ADDITION TO FUELING CATASTROPHIC FIRES, DROUGHTS CAN AFFECT WATER SUPPLIES, ANIMAL POPULATIONS AND CROP GROWTH.



FLOODING CAN BE DEADLIER DUE TO DRIER GROUND CONDITIONS AND SEVERE CLOUDBURSTS.



I'VE SEEN THOSE 'TURN AROUND, DON'T DROWN' BILLBOARDS WARNING AGAINST DRIVING THROUGH FLOODS.

ABSOLUTELY. IT'S A VITAL MESSAGE TO REMEMBER, ESPECIALLY AS CLIMATE CHANGE INTENSIFIES.





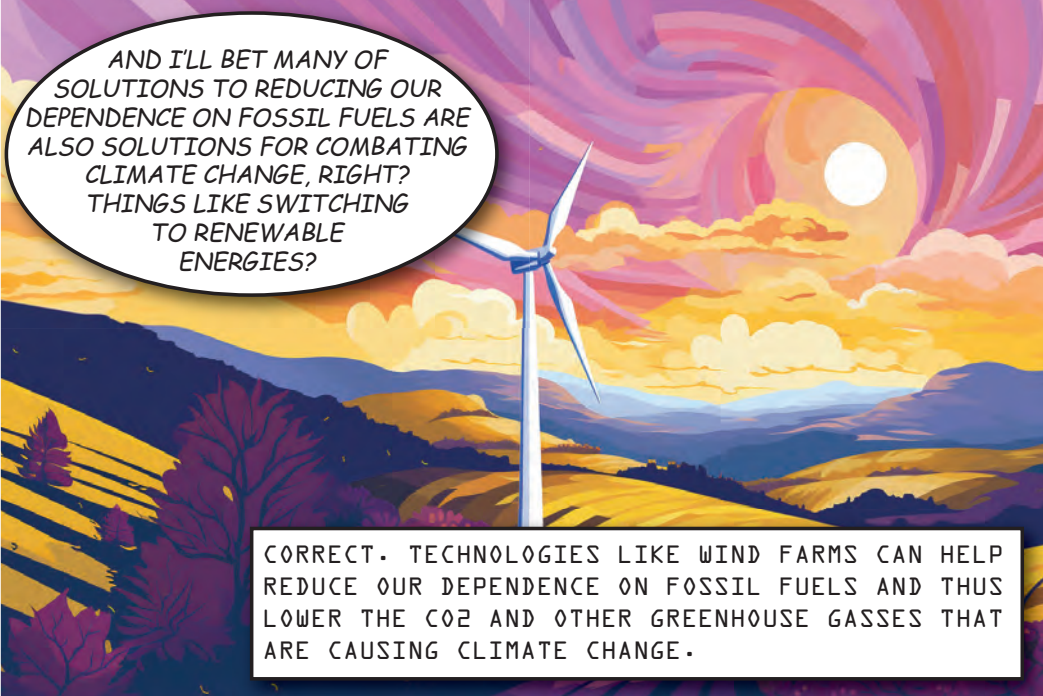
POLLUTION, LANDFILLS, FLOODING, DROUGHTS, WILDFIRES --WHAT A MESS!

IT'S A DAUNTING - EVEN INCOMPLETE - LIST, BUT THERE IS HOPE, BEY.

I'M ALL EARS!

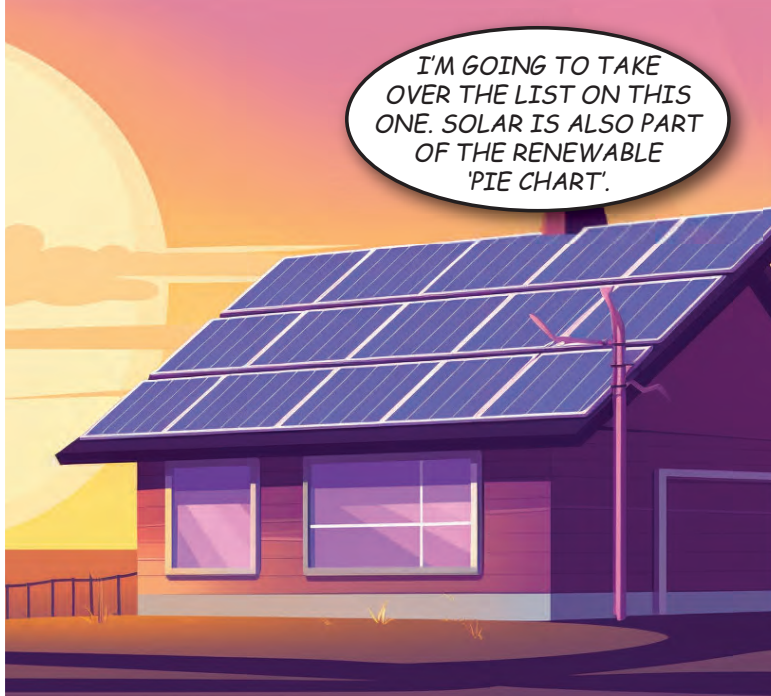


AS THIS IS ONE OF THE BIGGEST RISKS TO HUMANITY, WE HAVE SOME OF THE SMARTEST INDIVIDUALS AND MOST CAPABLE GOVERNMENTS AND ORGANIZATIONS ALREADY WORKING ON SOLUTIONS.



AND I'LL BET MANY OF SOLUTIONS TO REDUCING OUR DEPENDENCE ON FOSSIL FUELS ARE ALSO SOLUTIONS FOR COMBATING CLIMATE CHANGE, RIGHT? THINGS LIKE SWITCHING TO RENEWABLE ENERGIES?

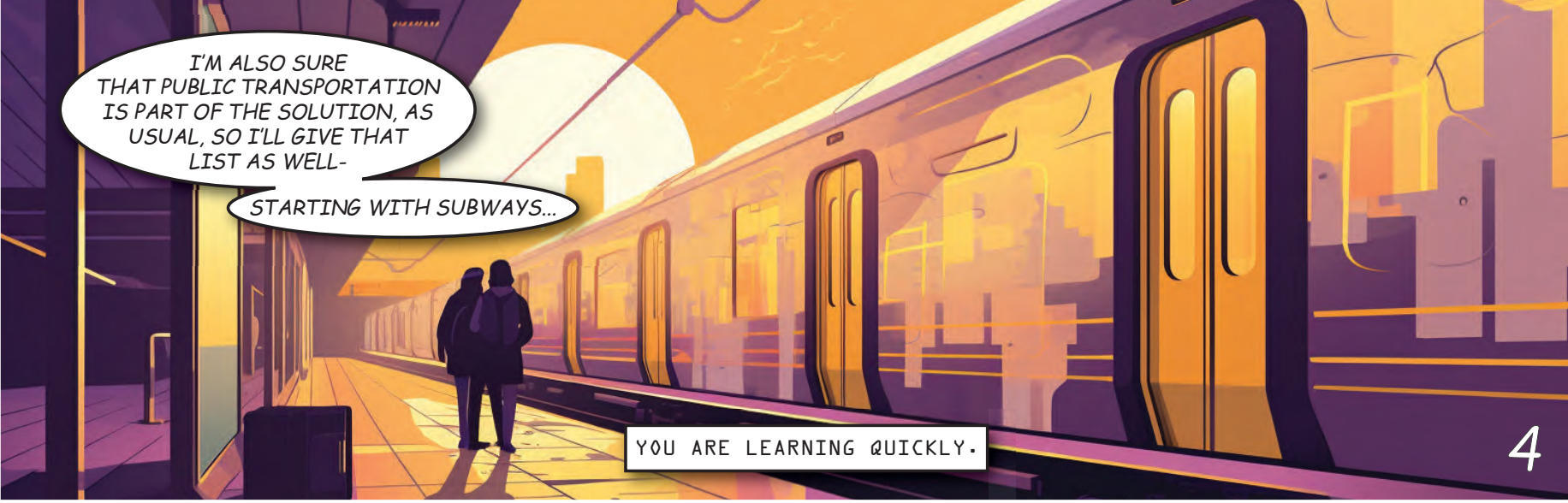
CORRECT. TECHNOLOGIES LIKE WIND FARMS CAN HELP REDUCE OUR DEPENDENCE ON FOSSIL FUELS AND THUS LOWER THE CO2 AND OTHER GREENHOUSE GASSES THAT ARE CAUSING CLIMATE CHANGE.



I'M GOING TO TAKE OVER THE LIST ON THIS ONE. SOLAR IS ALSO PART OF THE RENEWABLE 'PIE CHART'.




AS ARE HYDROELECTRIC, GEOTHERMAL, BIOMASS, NUCLEAR AND OTHER MORE GREENHOUSE GAS FRIENDLY ENERGY SOLUTIONS.




I'M ALSO SURE THAT PUBLIC TRANSPORTATION IS PART OF THE SOLUTION, AS USUAL, SO I'LL GIVE THAT LIST AS WELL-

STARTING WITH SUBWAYS...


YOU ARE LEARNING QUICKLY.



...RAIL SYSTEMS AND BUSES...



LET'S NOT FORGET WALKING, ROLLING AND BIKING...




...AS WELL AS ELECTRIFYING TRANSPORTATION, LIKE CARS BUSES, RAIL AND SO ON.

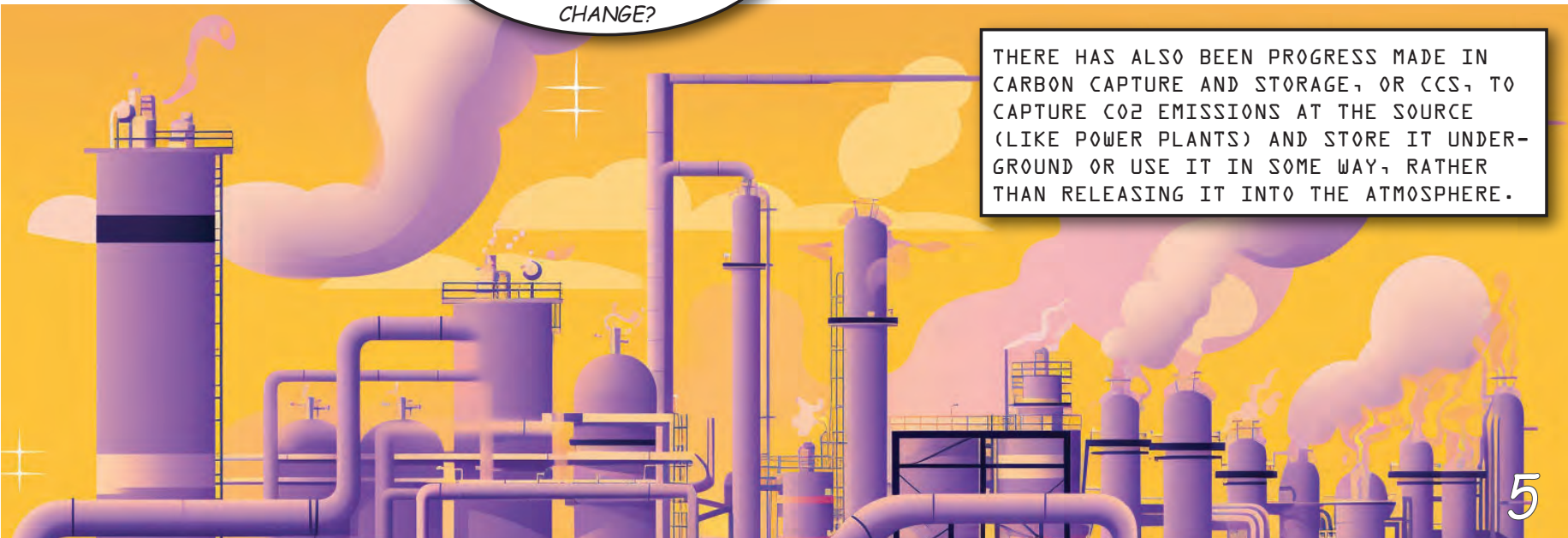


YOU ARE 'ON A ROLL', BEY.

HA! THAT'S ALL I GOT. AND THOSE SEEM LIKE PRETTY SLOW AND REACTIVE SOLUTIONS. WHAT CAN BE DONE PROACTIVELY TO FIGHT CLIMATE CHANGE?



PLANTING AND PROTECTING FORESTS ARE VITAL AS TREES NATURALLY CAPTURE CO₂ AND HAVE MANY OTHER BENEFITS TO PEOPLE AND WILDLIFE.



THERE HAS ALSO BEEN PROGRESS MADE IN CARBON CAPTURE AND STORAGE, OR CCS, TO CAPTURE CO₂ EMISSIONS AT THE SOURCE (LIKE POWER PLANTS) AND STORE IT UNDERGROUND OR USE IT IN SOME WAY, RATHER THAN RELEASING IT INTO THE ATMOSPHERE.



IMPROVEMENTS IN SUSTAINABLE AGRICULTURE HAVE DUAL BENEFITS BECAUSE THEY CAN PROTECT CROP PRODUCTION FROM CHANGES IN CLIMATE WHILE ALSO REDUCING THE CARBON FOOTPRINT OF THE PRODUCTION.

PLUS, SUSTAINABLE FARMING AND MEAT ALTERNATIVES HELP REDUCE METHANE EMISSIONS FROM LIVESTOCK.



GOOD QUESTION.

ALL THESE CURRENT EFFORTS SOUND ESSENTIAL, OND, BUT WHAT MIGHT COME ALONG IN THE FUTURE TO SPEED THIS UP?



I MENTIONED CARBON CAPTURE BEING USED TO PREVENT BURNED FOSSIL FUELS FROM CONTRIBUTING TO GREENHOUSE GASSES. IN THE FUTURE, MORE ADVANCED TECHNIQUES HOPE TO PULL IT DIRECTLY OUT OF THE AIR AND INTO THE GROUND, WHICH COULD SUBSTANTIALLY HELP OUR FIGHT AGAINST CLIMATE CHANGE.

SOME EVEN HOPE TO CONVERT THIS CAPTURED CO2 INTO USEFUL PRODUCTS LIKE ASPHALT, CONCRETE OR EVEN CONSUMER PRODUCTS.



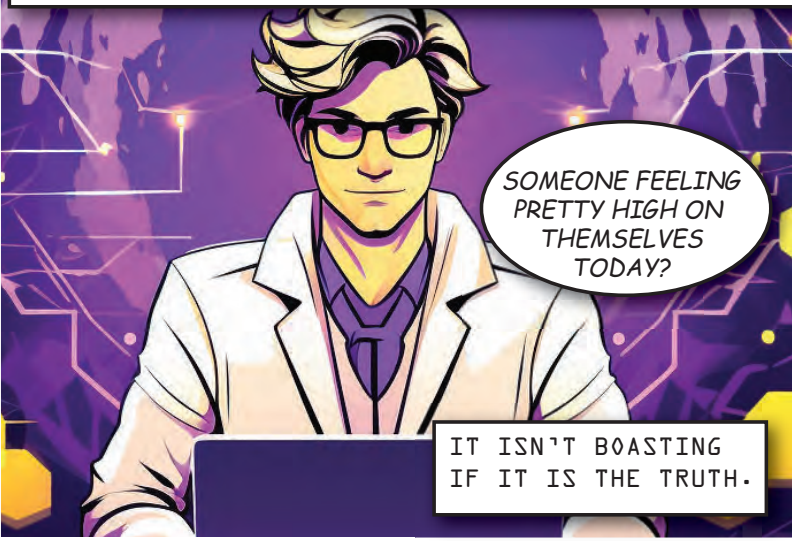
IMPRESSIVE!

THERE ARE ALSO THEORIES THAT SOLAR RADIATION MANAGEMENT MIGHT REFLECT A SMALL PERCENTAGE OF SUNLIGHT BACK INTO SPACE USING MIRRORS. MANY ARE WORKING ON OTHER IDEAS TO DIRECTLY AND INDIRECTLY COOL THE EARTH.



OTHERS ARE ALSO WORKING ON RESEARCH FOR MORE EFFICIENT AND NATURAL FORMS OF CO2 CAPTURE LIKE PHYTOPLANKTON AND ALGAE.

AND WHO KNOWS WHAT IS POSSIBLE WITH ADVANCES IN AI. IF INTELLIGENCES ARE DEVELOPED FAR SUPERIOR TO HUMANS, THERE MAY BE BETTER SOLUTIONS THAT HAVEN'T EVEN BEEN THOUGHT OF YET.



SOMEONE FEELING PRETTY HIGH ON THEMSELVES TODAY?

IT ISN'T BOASTING IF IT IS THE TRUTH.



YOU DO HAVE A POINT, THOUGH. TECHNOLOGY HAS ADVANCED SO QUICKLY IN THE LAST 50 YEARS, THERE'S NO TELLING WHAT WE MIGHT BE ABLE TO ACCOMPLISH IN THE NEXT 50.



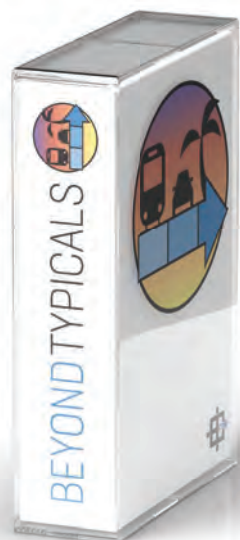
HONESTLY, BEY, THE BEST HOPE MAY BE THE NEXT GENERATION. GIVEN THE RIGHT TOOLS, THE NEXT EINSTEIN MAY SAVE US ALL.

NO KIDDING. HAVE YOU EVER SEEN A 3-YEAR-OLD WITH A TABLET?



HERE'S HOPING THE FUTURE IS IN GOOD (TINY) HANDS.

AND NOT STICKY ONES!



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DANGEROUS TRANSPORTATION

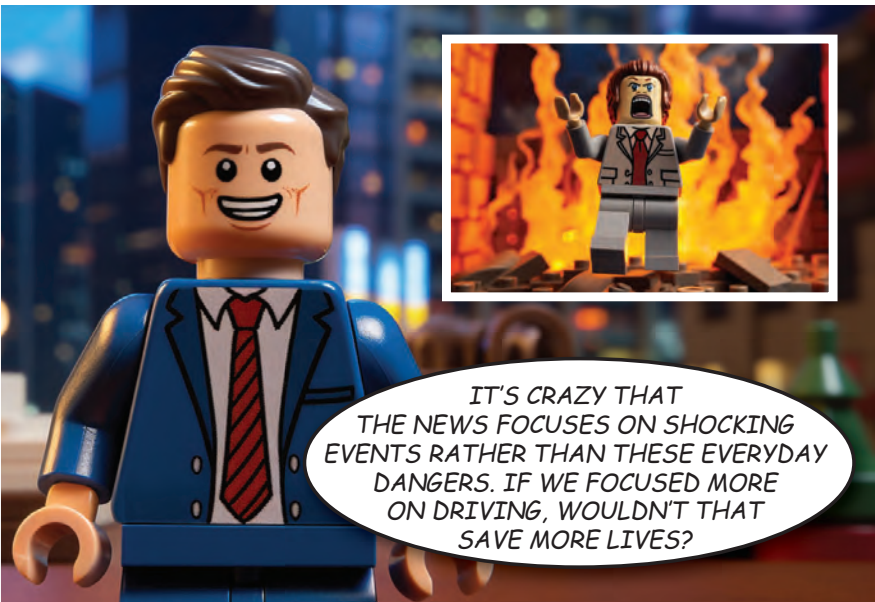


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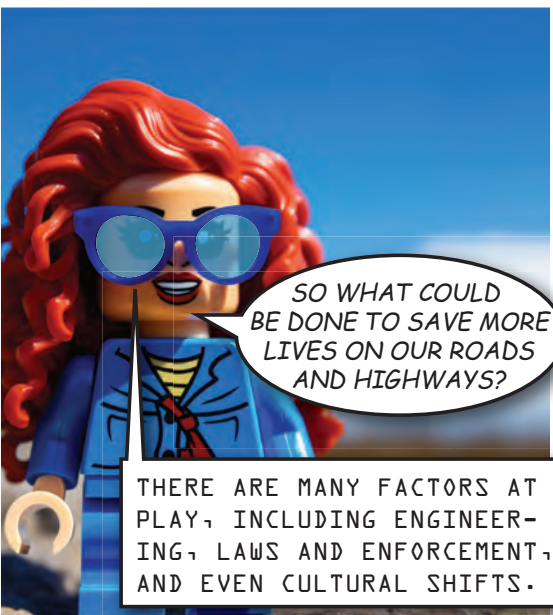
AND, I JUST HEARD THAT OVER 30,000 PEOPLE DIE FROM VEHICLE RELATED CRASHES EVERY YEAR IN THE UNITED STATES ALONE. I KNOW WE'VE TALKED ABOUT THE DANGERS OF DISTRACTED DRIVING, BUT THAT MANY FATALITIES IS SURPRISING!

YOU'RE RIGHT, BEY. ON A RATE BASIS, DRIVING HAS GOTTEN SAFER OVER THE PAST 100 YEARS. HOWEVER, MORE PEOPLE ARE DRIVING NOW AND IT'S RISKIER THAN OTHER FORMS OF TRANSPORTATION.



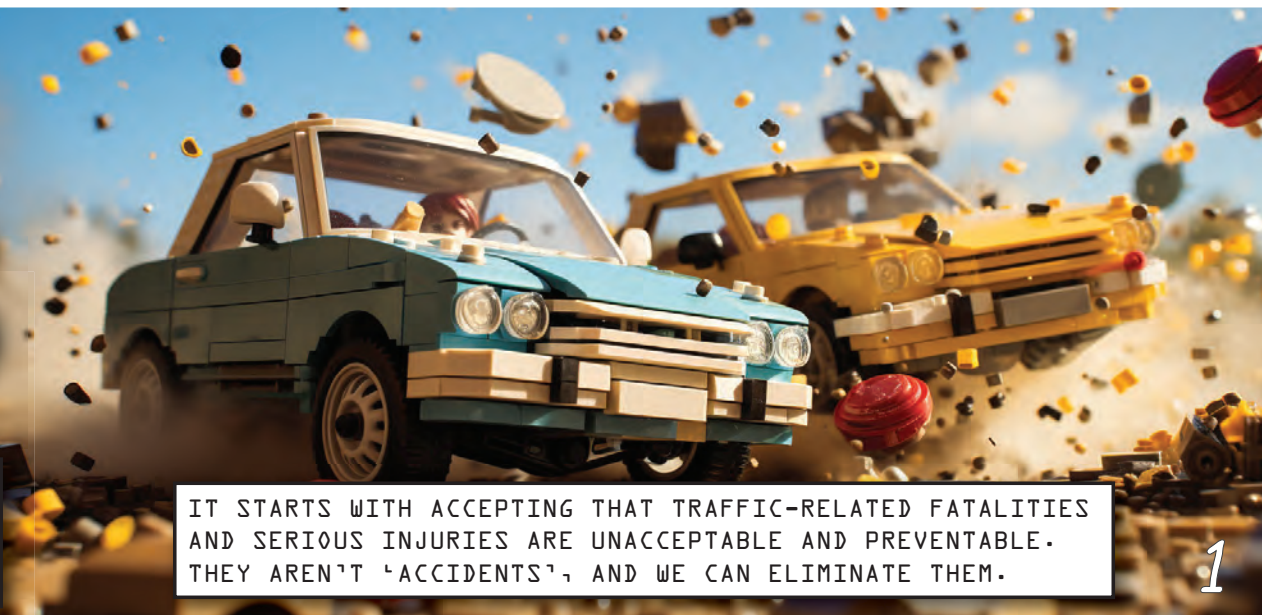
IT'S CRAZY THAT THE NEWS FOCUSES ON SHOCKING EVENTS RATHER THAN THESE EVERYDAY DANGERS. IF WE FOCUSED MORE ON DRIVING, WOULDN'T THAT SAVE MORE LIVES?

YOU MAKE GREAT POINTS, BEY. IF SOCIETY FOCUSED MORE ON TRANSPORTATION SAFETY, WE COULD SAVE THOUSANDS OF LIVES. BUT SADLY, NEWS AND SOCIAL MEDIA OFTEN PRIORITIZE SENSATIONAL STORIES.



SO WHAT COULD BE DONE TO SAVE MORE LIVES ON OUR ROADS AND HIGHWAYS?

THERE ARE MANY FACTORS AT PLAY, INCLUDING ENGINEERING, LAWS AND ENFORCEMENT, AND EVEN CULTURAL SHIFTS.



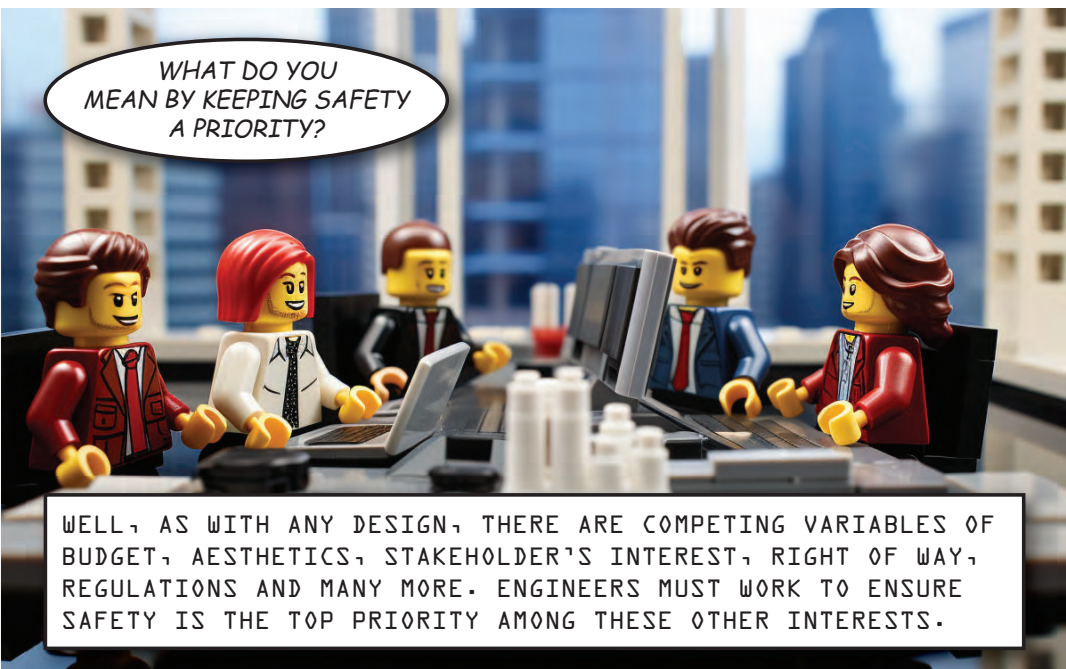
IT STARTS WITH ACCEPTING THAT TRAFFIC-RELATED FATALITIES AND SERIOUS INJURIES ARE UNACCEPTABLE AND PREVENTABLE. THEY AREN'T 'ACCIDENTS', AND WE CAN ELIMINATE THEM.

THAT MAKES SENSE!
SO WHAT ROLE DOES
ENGINEERING PLAY?

TRANSPORTATION ENGINEERS STRIVE TO DESIGN ROADS TO BE AS SAFE AS POSSIBLE. THIS INCLUDES FOLLOWING AND UPDATING GUIDELINES THAT ARE INCREASINGLY EFFECTIVE, BUT PART OF IT IS INTUITIVE, KEEPING SAFETY A PRIORITY THROUGHOUT THE DESIGN PROCESS.

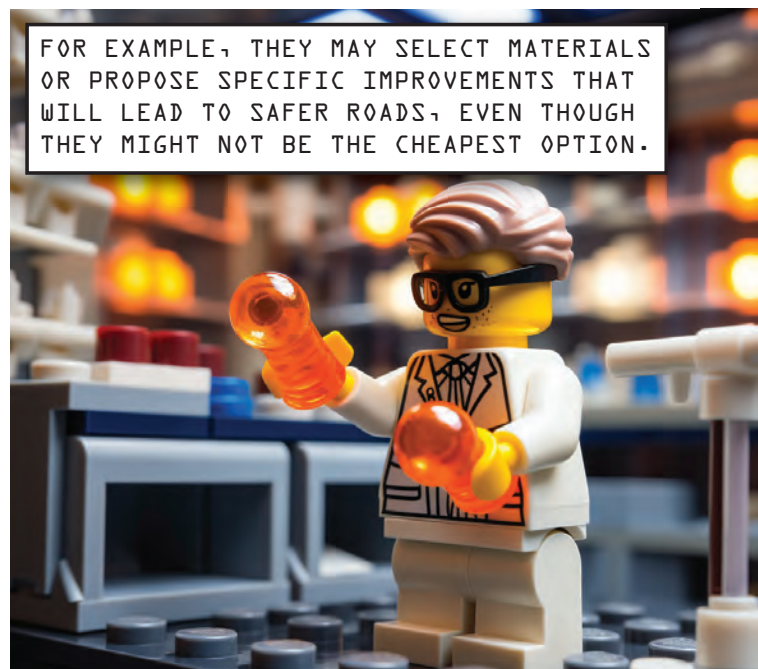


WHAT DO YOU
MEAN BY KEEPING SAFETY
A PRIORITY?



WELL, AS WITH ANY DESIGN, THERE ARE COMPETING VARIABLES OF BUDGET, AESTHETICS, STAKEHOLDER'S INTEREST, RIGHT OF WAY, REGULATIONS AND MANY MORE. ENGINEERS MUST WORK TO ENSURE SAFETY IS THE TOP PRIORITY AMONG THESE OTHER INTERESTS.

FOR EXAMPLE, THEY MAY SELECT MATERIALS OR PROPOSE SPECIFIC IMPROVEMENTS THAT WILL LEAD TO SAFER ROADS, EVEN THOUGH THEY MIGHT NOT BE THE CHEAPEST OPTION.



ENGINEERS CAN ALSO
ASSESS THE PROJECT SITE
FIRSTHAND, WITNESSING
AND CONSIDERING VARIOUS
PERSPECTIVES, AGAIN WITH
SAFE DESIGN IN MIND.

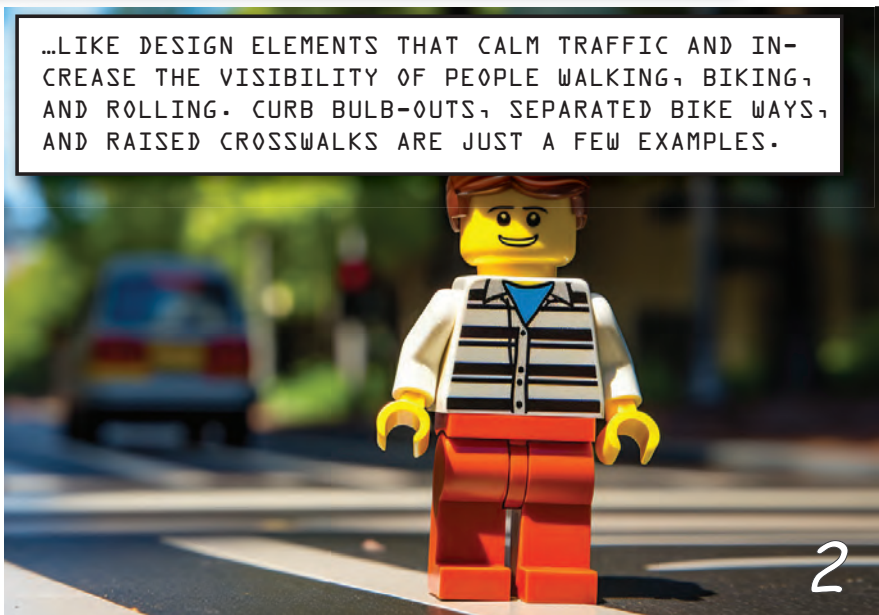


THERE ARE MANY OPTIONS TO MAKE THEIR DESIGNS SAFER AND ARE OFTEN CONTEXT-SPECIFIC. HIGHWAY SAFETY MEASURES INCLUDE RUMBLE STRIPS, GUARDRAIL AND BARRIER RAIL, IMPACT ATTENUATORS, AND OTHER HIGH-SPEED CRASH BARRIERS.

...LIKE DESIGN ELEMENTS THAT CALM TRAFFIC AND INCREASE THE VISIBILITY OF PEOPLE WALKING, BIKING, AND ROLLING. CURB BULB-OUTS, SEPARATED BIKE WAYS, AND RAISED CROSSWALKS ARE JUST A FEW EXAMPLES.

WHAT ABOUT
DOWNTOWN
STREETS?

IMPROVING SAFETY IN URBAN SETTINGS USUALLY ENTAILS PROTECTING THE MOST VULNERABLE USERS OF A ROADWAY...





ENGINEERS ALSO HAVE TO THINK ABOUT HOW TO KEEP THESE STREETS AND HIGHWAYS SAFE DURING CONSTRUCTION AND MAINTENANCE AS WELL.



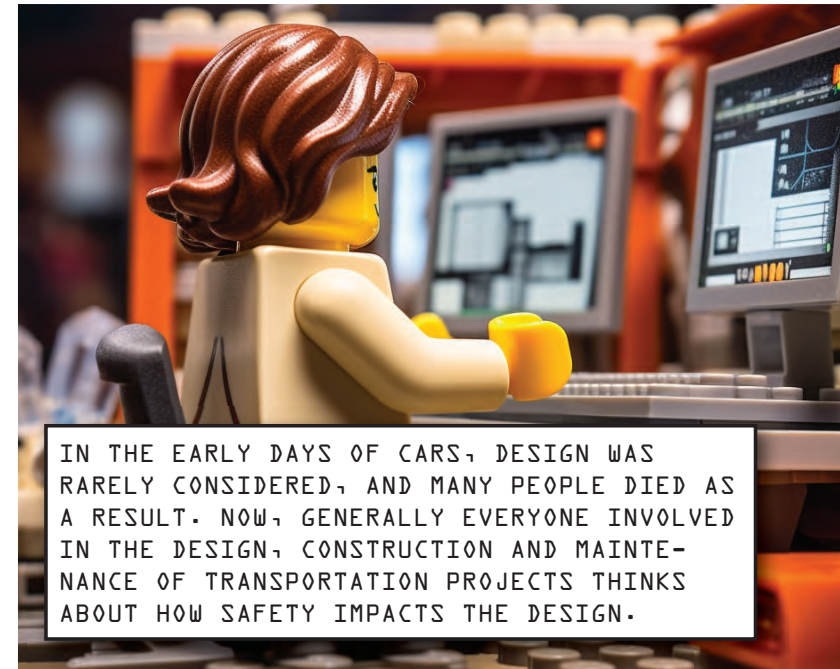
WHAT'S AN EXAMPLE OF THAT?

TAKE SNOW REMOVAL. ENGINEERS NEED TO DESIGN ROADS THAT CAN BE EASILY CLEARED OF SNOW AND ICE TO PREVENT SLIPPERY CONDITIONS IN ADVERSE WEATHER.



THERE ARE ALSO SAFETY CONSIDERATIONS IN BRIDGE AND RETAINING WALL DESIGN. AND DON'T FORGET PROPER PAVEMENT MARKINGS, SIGNAGE AND LIGHTING PLAY A ROLE IN ROAD SAFETY AS WELL.

WOW, THERE'S WAY MORE TO ROAD SAFETY DESIGN THAN I WOULD HAVE THOUGHT!



IN THE EARLY DAYS OF CARS, DESIGN WAS RARELY CONSIDERED, AND MANY PEOPLE DIED AS A RESULT. NOW, GENERALLY EVERYONE INVOLVED IN THE DESIGN, CONSTRUCTION AND MAINTENANCE OF TRANSPORTATION PROJECTS THINKS ABOUT HOW SAFETY IMPACTS THE DESIGN.



SO ALL OF THIS RESULTS IN SAVED LIVES?

ABSOLUTELY. OUR ROADS HAVE CONTINUALLY BEEN BUILT SAFER OVER THE DECADES, THANKS TO THE EFFORTS OF THESE DESIGNERS AND CONTRACTORS. AS OLDER ROADS AND BRIDGES ARE REPLACED AND DESIGN CRITERIA IMPROVES, ROADWAYS WILL BECOME EVEN SAFER AND FATALITY RATES WILL CONTINUE TO DROP.



OKAY, WHAT ABOUT THE DESIGN OF THE ACTUAL VEHICLE?

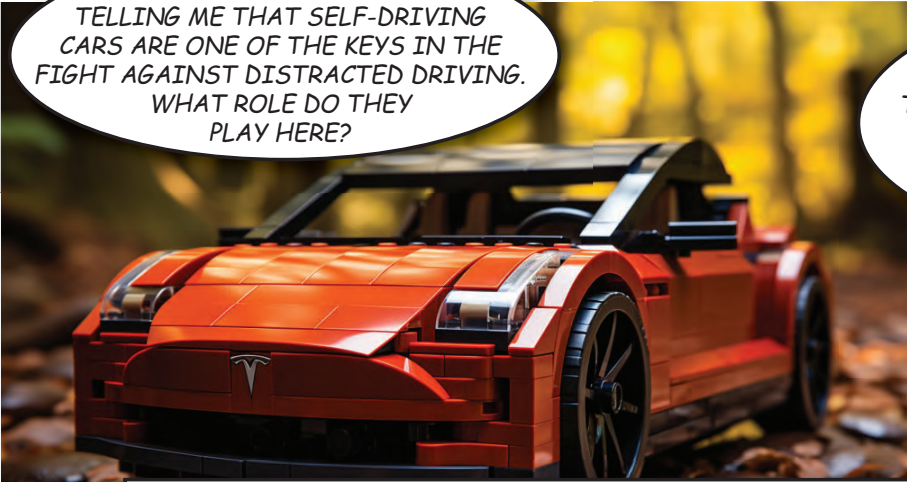
WHAT WE ARE DRIVING IN MAKES AS MUCH A DIFFERENCE AS WHAT WE ARE DRIVING ON. SIMILAR TO THE DESIGN OF THE ROADS, AUTOMOTIVE DESIGN CODES HAVE EVOLVED, REQUIRING SAFETY ELEMENTS THAT ARE PROVEN TO WORK - LIKE SEATBELTS AND AIRBAGS.

IMPROVEMENTS IN TECHNOLOGY AND TESTING TECHNIQUES HAVE MADE ELEMENTS OF VEHICLE DESIGN LIKE CRUMPLE ZONES AND MATERIAL COMPOSITION MUCH BETTER AT PROTECTING PASSENGERS IN THE EVENT OF A CRASH.



AND MORE ACTIVE TECHNOLOGIES LIKE CRASH DETECTION HAVE ONLY BEGUN TO SHOW THEIR POTENTIAL IN SAVING LIVES.

I REMEMBER YOU TELLING ME THAT SELF-DRIVING CARS ARE ONE OF THE KEYS IN THE FIGHT AGAINST DISTRACTED DRIVING. WHAT ROLE DO THEY PLAY HERE?



THEN WHY ARE WE STILL MANUALLY DRIVING CARS? THE AI THAT IS POWERING YOU HAS BEEN AROUND FOR A WHILE AND KEEPS GETTING BETTER. IS IT THAT HARD TO MAKE A CAR DRIVE ITSELF?



YES, AUTONOMOUS CARS REPRESENT THE BIGGEST POTENTIAL IMPROVEMENT IN TRANSPORTATION SAFETY. IF WE WIDELY ADOPT THEM, IT COULD SAVE TENS OF THOUSANDS OF LIVES EVERY YEAR, JUST IN THE UNITED STATES.




IT'S A COMPLEX ISSUE. IN MANY SITUATIONS, AUTONOMOUS CARS ARE ALREADY SAFER THAN HUMAN ERROR. BUT MAKING SURE THEY CAN SAFELY NAVIGATE UNIQUE CONFLICTS AND OUTLIER CONDITIONS LIKE ADVERSE WEATHER AND UNPAVED ROADS HAS PROVEN CHALLENGING.




AND MANY PEOPLE ARE AFRAID OF HANDING OVER CONTROL TO A COMPUTER. THAT CAN BE UNSETTLING TO SOMEONE THAT HAS SPENT DECADES SAFELY DRIVING MANUALLY.



PUBLIC PERCEPTION IS A HUGE HURDLE FOR APPROVAL OF AUTONOMOUS VEHICLES DRIVING ON SHARED ROADS WITH OTHER TRAFFIC. GOVERNMENT APPROVAL IS VITAL, BUT POLITICIANS FACE THESE AND OTHER CHALLENGES BEFORE MASS ADOPTION CAN BEGIN.



I REMEMBER HEARING THAT MAKERS OF SELF-DRIVING CARS ARE HOPING TO MAKE THEM AT LEAST 10 TIMES SAFER THAN HUMAN DRIVERS. THAT MEANS THAT 30,000 FATALITIES A YEAR COULD BE CUT TO 3,000 OR LESS!



THAT'S RIGHT. AUTONOMOUS VEHICLES REPRESENT A HUGE OPPORTUNITY TO REDUCE INJURY AND FATALITY CRASHES ON OUR ROADS.

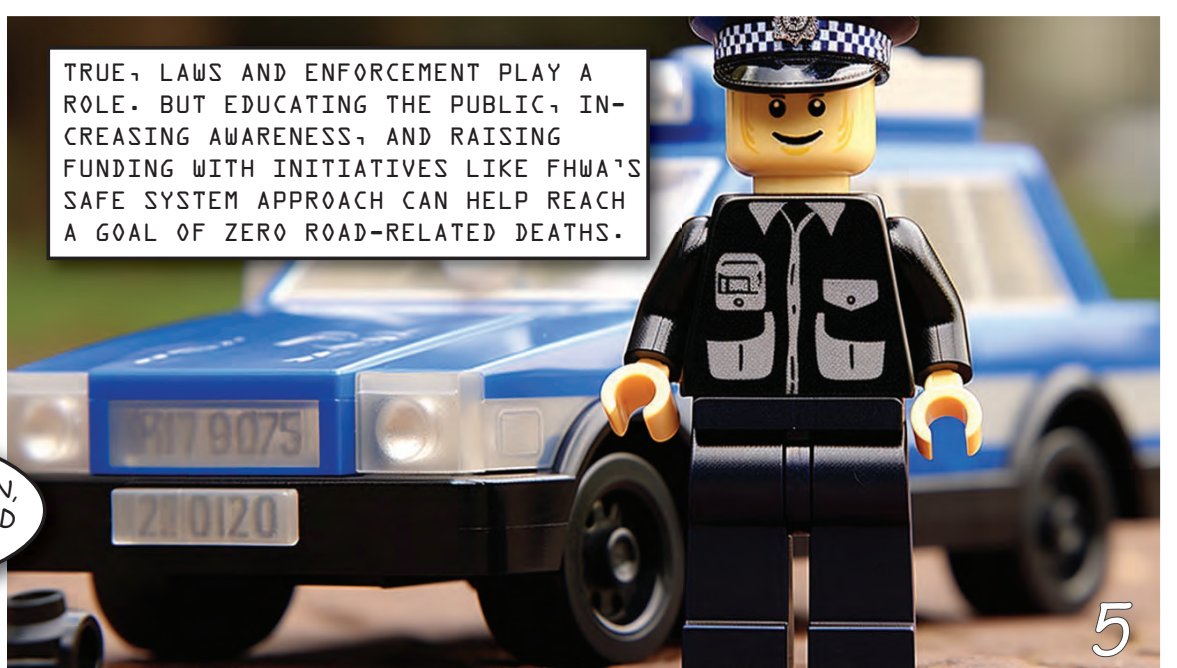
ANYTHING ELSE?




HAVE YOU FORGOTTEN THAT PUBLIC TRANSPORTATION IS OFTEN PART OF THE SOLUTION?

YES, BUT ON AVERAGE, PUBLIC TRANSPORTATION IS GENERALLY SAFER THAN DRIVING VEHICLES INDIVIDUALLY. LARGER VEHICLES CAN BETTER WITHSTAND IMPACTS, AND TRAINED PROFESSIONAL DRIVERS FOLLOW STRICTER REGULATION AND OVERSIGHT THAN STANDARD DRIVERS.

EVEN WITH THIS? BUS DRIVERS CAN STILL MAKE MISTAKES, AND TRAINS CAN STILL CRASH.



TRUE, LAWS AND ENFORCEMENT PLAY A ROLE. BUT EDUCATING THE PUBLIC, INCREASING AWARENESS, AND RAISING FUNDING WITH INITIATIVES LIKE FHWA'S SAFE SYSTEM APPROACH CAN HELP REACH A GOAL OF ZERO ROAD-RELATED DEATHS.



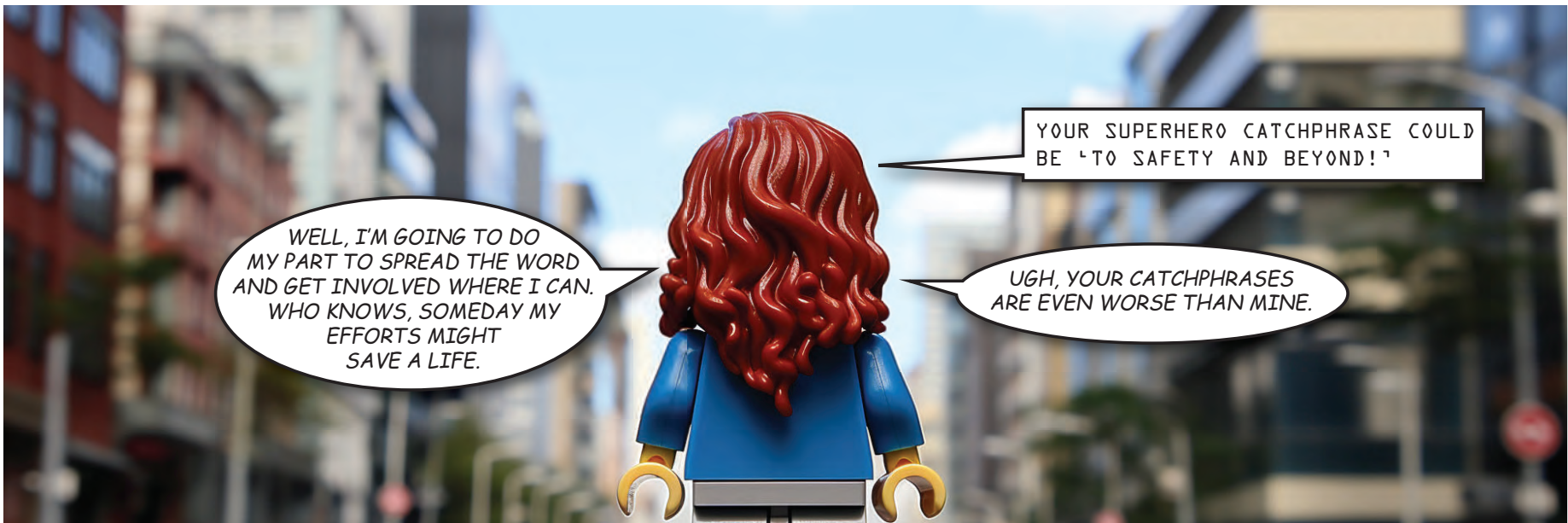
A LOT OF THIS IS ON US- PAY ATTENTION, WEAR YOUR SEATBELT, AND DON'T DRIVE TOO FAST.



YOU KNOW IN SUPERHERO MOVIES WHEN THEY COME IN TO DEFEAT THE VILLIAN AND SAVE EVERYONE'S LIFE? IT'S CRAZY TO THINK THAT WITH A LITTLE MORE WORK, WE CAN BE ACTUAL SUPERHEROES!



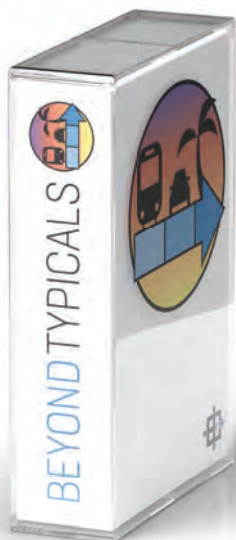
IT'S A VALID POINT. WITH EACH NEW INNOVATION, CAREFULLY DESIGNED ROAD OR PUBLIC OUTREACH CAMPAIGN, DEATHS ARE PREVENTED. THESE UNSUNG HEROES MAY NEVER GET THE ATTENTION THEY DESERVE, BUT THEIR WORK SAVES LIVES EVERY DAY.



WELL, I'M GOING TO DO MY PART TO SPREAD THE WORD AND GET INVOLVED WHERE I CAN. WHO KNOWS, SOMEDAY MY EFFORTS MIGHT SAVE A LIFE.

YOUR SUPERHERO CATCHPHRASE COULD BE 'TO SAFETY AND BEYOND!'

UGH, YOUR CATCHPHRASES ARE EVEN WORSE THAN MINE.




BEYOND VS IS A PRODUCTION OF BEYOND CAD INC

WRITTEN BY: SAM LYTLE, PE
BRIAN SROUFE, PE
CHAT GPT

LAYOUT AND DESIGN: SAM LYTLE, PE

IMAGE GENERATION: MIDJOURNEY


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6

BEYOND VS

OUTDATED INFRASTRUCTURE



#9



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I'VE GOT SOME BIG NEWS, OND!



GO ON.

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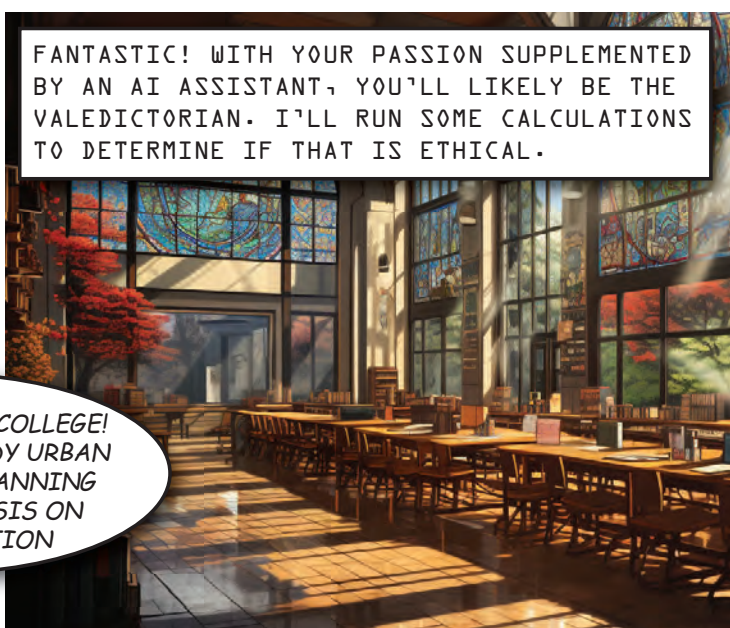
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YOU'VE TAKEN TO THESE SUBJECTS NATURALLY, SO IT DOESN'T SURPRISE ME.

EXACTLY! WHAT I'M SAYING IS- IT'S NO COINCIDENCE HOW WE GOT HERE. NOW, THE BIG NEWS...

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FANTASTIC! WITH YOUR PASSION SUPPLEMENTED BY AN AI ASSISTANT, YOU'LL LIKELY BE THE VALEDICTORIAN. I'LL RUN SOME CALCULATIONS TO DETERMINE IF THAT IS ETHICAL.



SO I'M GOING TO COLLEGE TOO?!


NO NEED! THE UNIVERSITY IS OKAY WITH AI ASSISTANCE. YOU'RE NOT THAT SPECIAL, YOU KNOW.

YEP. YOU'LL BE WITH ME THE WHOLE WAY.



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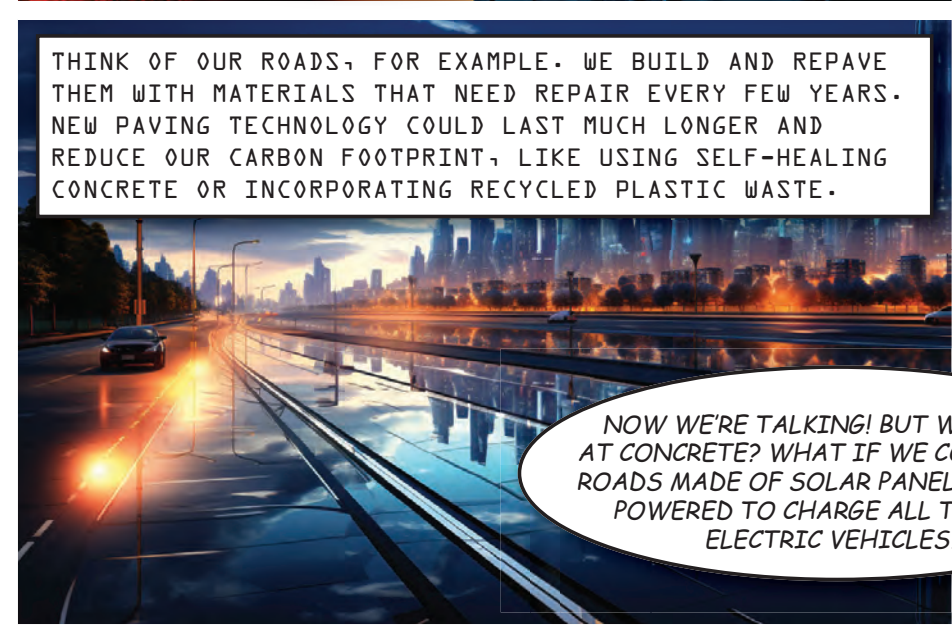
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YES! THIS IS WHAT I'M TALKING ABOUT. I'M GRATEFUL FOR THE WORLD WE HAVE AND ALL OF THOSE THAT HAVE MADE IT POSSIBLE, BUT THERE IS NO REASON WHY WE CAN'T SWAP OUT THE OLD WORLD WITH THE NEW AND AMAZING.

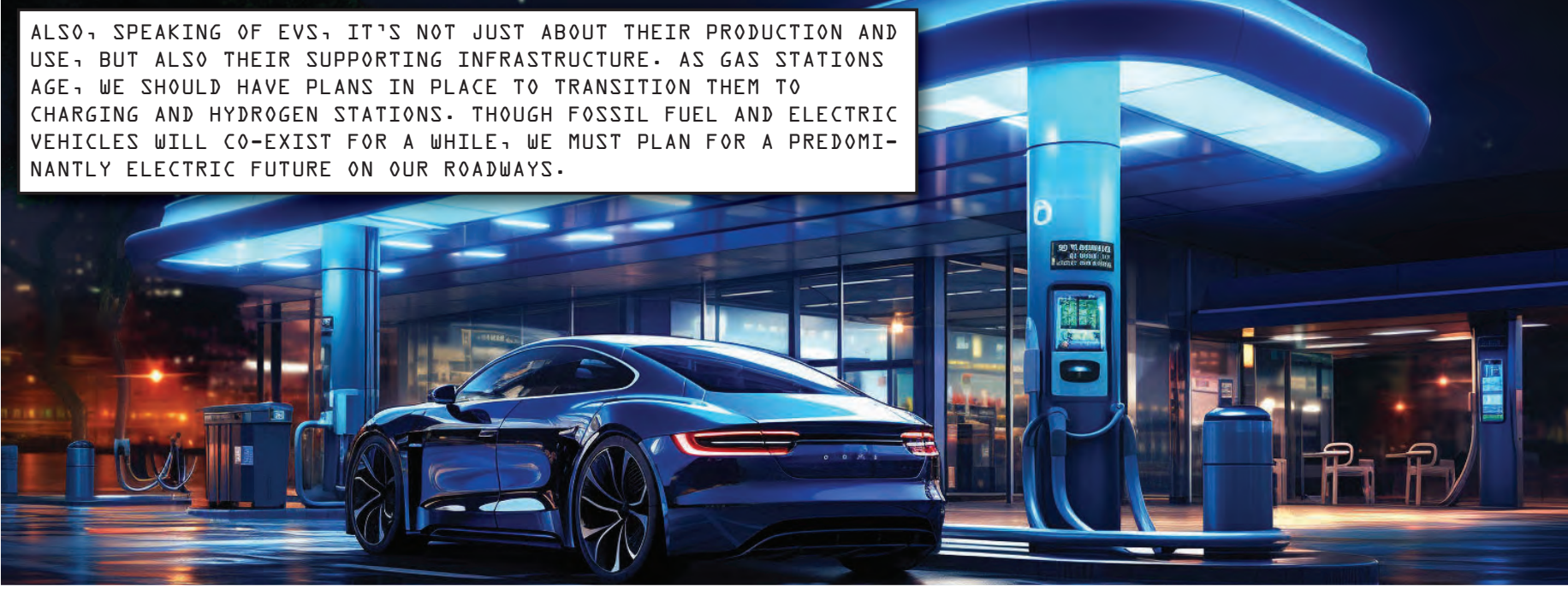


THINK OF OUR ROADS, FOR EXAMPLE. WE BUILD AND REPAVE THEM WITH MATERIALS THAT NEED REPAIR EVERY FEW YEARS. NEW PAVING TECHNOLOGY COULD LAST MUCH LONGER AND REDUCE OUR CARBON FOOTPRINT, LIKE USING SELF-HEALING CONCRETE OR INCORPORATING RECYCLED PLASTIC WASTE.

NOW WE'RE TALKING! BUT WHY STOP AT CONCRETE? WHAT IF WE COULD HAVE ROADS MADE OF SOLAR PANELS OR WERE POWERED TO CHARGE ALL THE NEW ELECTRIC VEHICLES?

THERE ARE SOME CURRENT ROADBLOCKS WITH THOSE IDEAS, BUT I LIKE YOUR AMBITION.

ALSO, SPEAKING OF EVS, IT'S NOT JUST ABOUT THEIR PRODUCTION AND USE, BUT ALSO THEIR SUPPORTING INFRASTRUCTURE. AS GAS STATIONS AGE, WE SHOULD HAVE PLANS IN PLACE TO TRANSITION THEM TO CHARGING AND HYDROGEN STATIONS. THOUGH FOSSIL FUEL AND ELECTRIC VEHICLES WILL CO-EXIST FOR A WHILE, WE MUST PLAN FOR A PREDOMINANTLY ELECTRIC FUTURE ON OUR ROADWAYS.



AND WHILE CERTAIN CITIES BOAST EFFECTIVE PUBLIC TRANSPORTATION, MANY COULD USE UPGRADES. MAGLEV AND OTHER NEW TECHNOLOGIES CAN INCREASE THE SPEED AND EFFICIENCY OF RAIL SERVICE, ESPECIALLY FOR LONG DISTANCES BETWEEN CITIES.



BUSES AND OTHER FORMS OF TRANSIT CAN BE ELECTRIFIED WITH NETWORK-CONNECTED ROUTES OPTIMIZED BY ARTIFICIAL INTELLIGENCE FOR EFFICIENCY AND ACCESSIBILITY.



THEN THERE'S AUTONOMOUS DRIVING. WITH AI-OPTIMIZED TRANSPORTATION, CONGESTION AND CRASHES COULD BE VIRTUALLY ELIMINATED.



AND TRANSPORTATION GOES BEYOND CARS AND TRAINS. PORTS CAN ALSO BE IMPROVED WITH AI TECHNOLOGY, MAKING SHIPPING SMOOTHER, FASTER, AND CHEAPER.



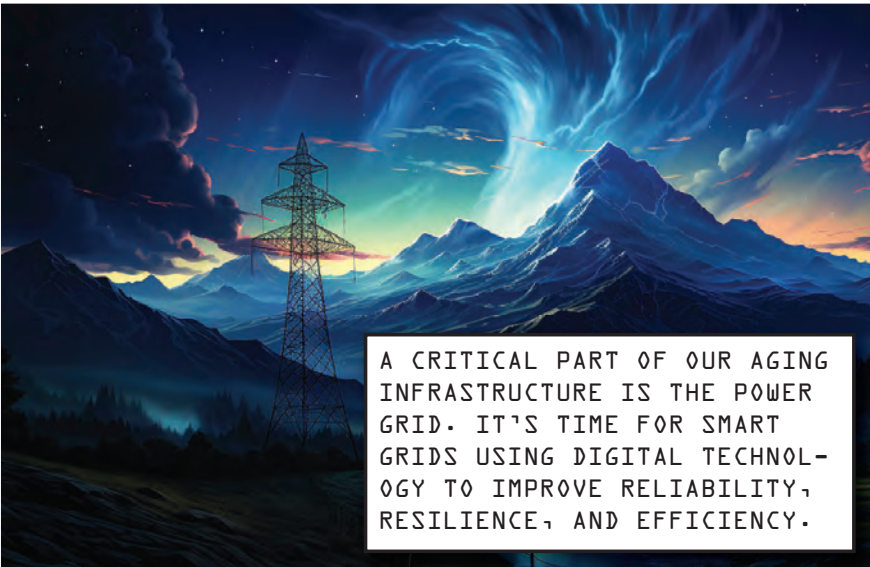
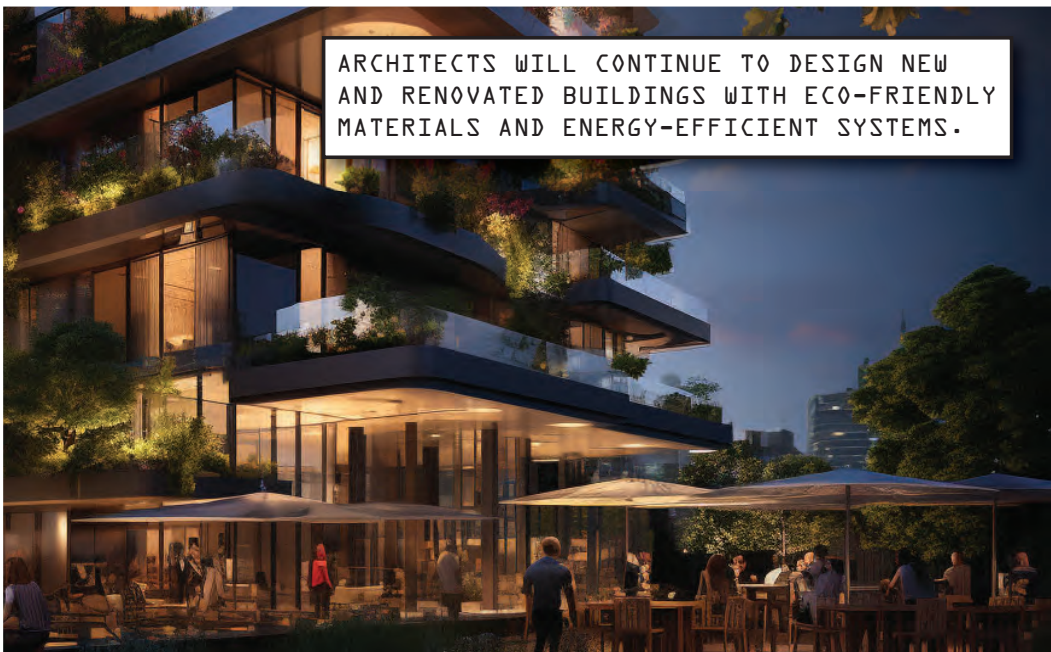
AIRPORTS CAN ALSO BE STREAMLINED TO BETTER MANAGE FLIGHTS AND CHECK-INS WITH FEWER DELAYS. AND WHILE AIRPLANES MAY TAKE MORE TIME TO TRANSITION AWAY FROM FOSSIL FUELS DUE TO BATTERY WEIGHT CONSTRAINTS, IMPROVED HIGH SPEED RAIL AND OTHER MODES OF TRANSPORTATION SHOULD REDUCE AIR TRAVEL DEMAND, THUS REDUCING OUR CARBON FOOTPRINT.



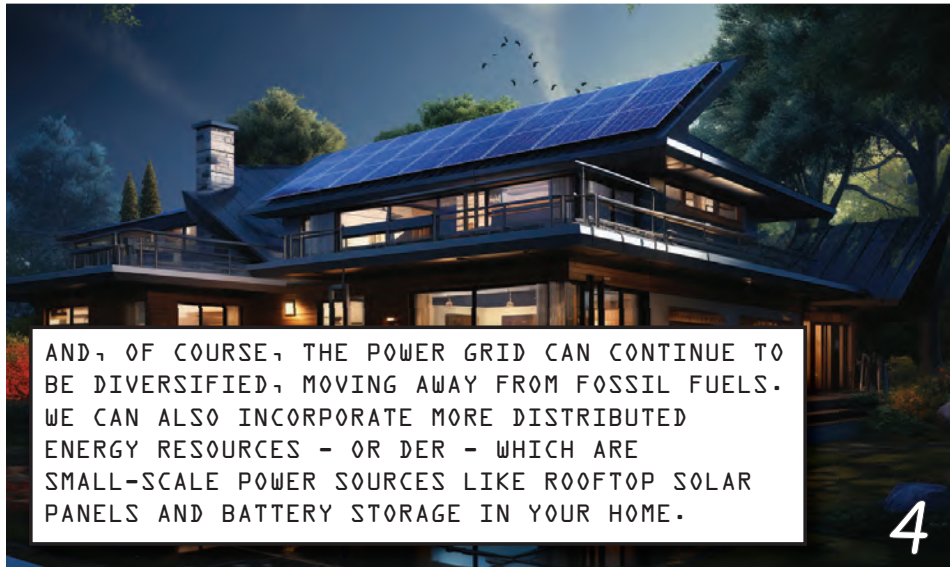
I'M SO GLAD YOU ASKED.

ALL THIS IS THRILLING! I KNOW WE LOVE TRANSPORTATION, BUT WHAT ELSE CAN BE OPTIMIZED WITH THESE NEW TECHNOLOGIES?

ARCHITECTS WILL CONTINUE TO DESIGN NEW AND RENOVATED BUILDINGS WITH ECO-FRIENDLY MATERIALS AND ENERGY-EFFICIENT SYSTEMS.

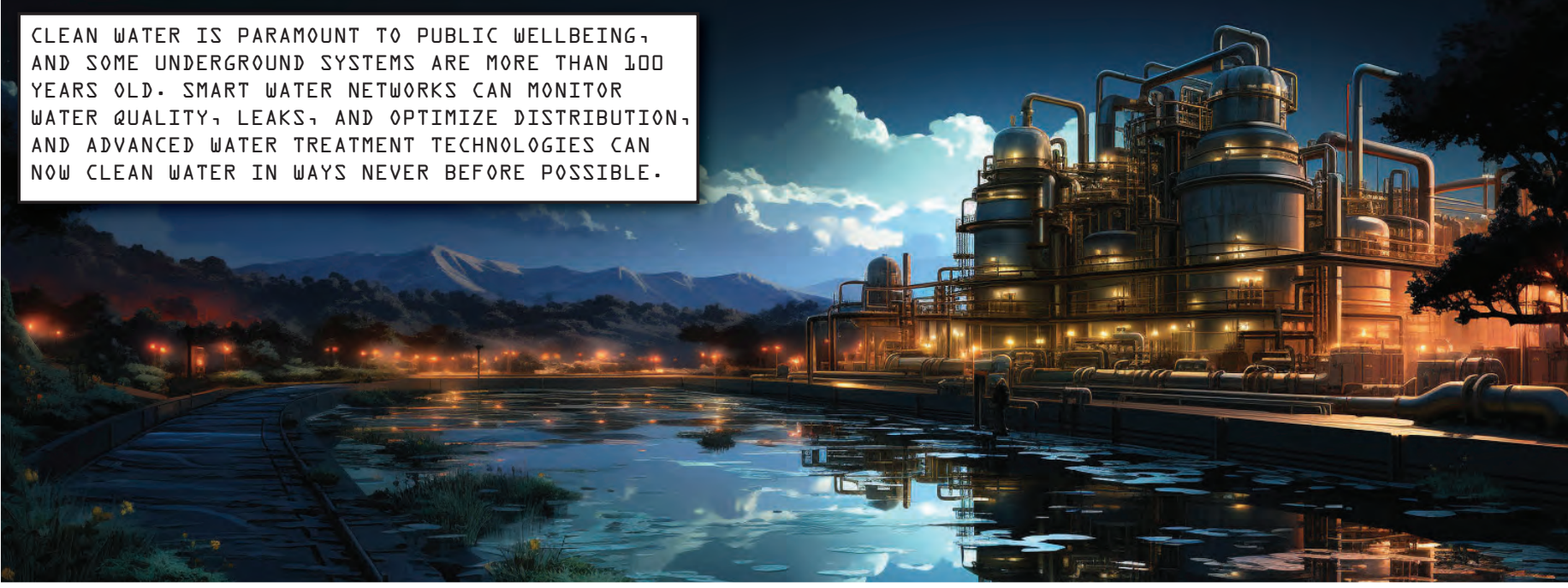


A CRITICAL PART OF OUR AGING INFRASTRUCTURE IS THE POWER GRID. IT'S TIME FOR SMART GRIDS USING DIGITAL TECHNOLOGY TO IMPROVE RELIABILITY, RESILIENCE, AND EFFICIENCY.

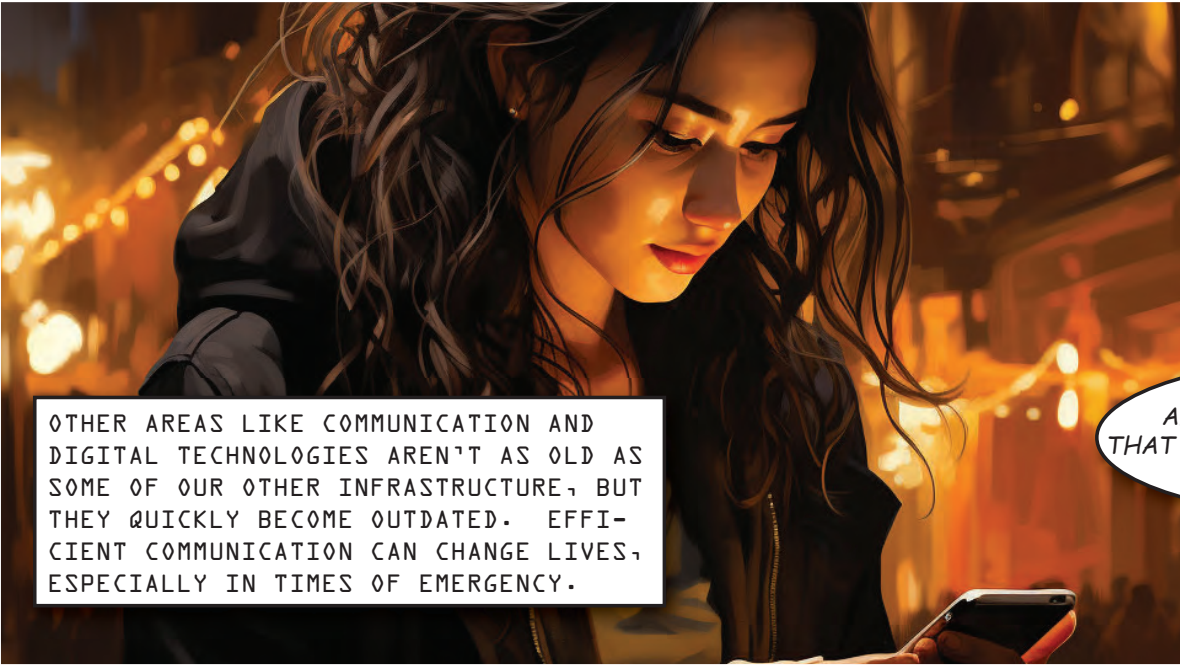


AND, OF COURSE, THE POWER GRID CAN CONTINUE TO BE DIVERSIFIED, MOVING AWAY FROM FOSSIL FUELS. WE CAN ALSO INCORPORATE MORE DISTRIBUTED ENERGY RESOURCES - OR DER - WHICH ARE SMALL-SCALE POWER SOURCES LIKE ROOFTOP SOLAR PANELS AND BATTERY STORAGE IN YOUR HOME.

CLEAN WATER IS PARAMOUNT TO PUBLIC WELLBEING, AND SOME UNDERGROUND SYSTEMS ARE MORE THAN 100 YEARS OLD. SMART WATER NETWORKS CAN MONITOR WATER QUALITY, LEAKS, AND OPTIMIZE DISTRIBUTION, AND ADVANCED WATER TREATMENT TECHNOLOGIES CAN NOW CLEAN WATER IN WAYS NEVER BEFORE POSSIBLE.



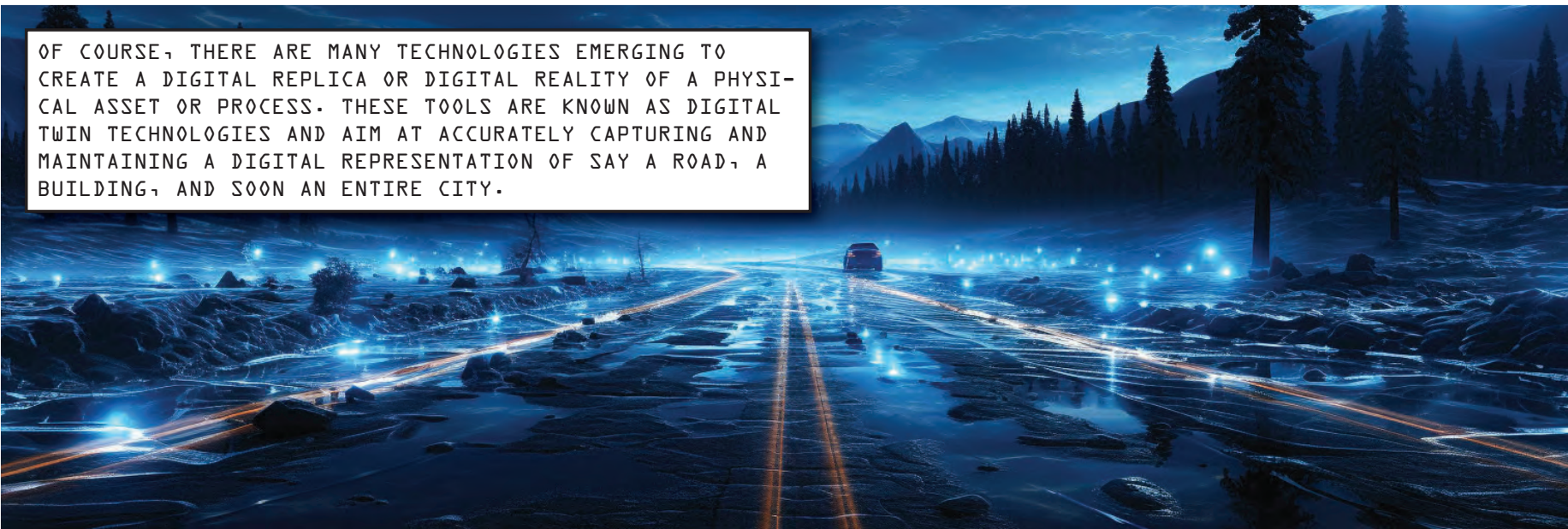
OTHER AREAS LIKE COMMUNICATION AND DIGITAL TECHNOLOGIES AREN'T AS OLD AS SOME OF OUR OTHER INFRASTRUCTURE, BUT THEY QUICKLY BECOME OUTDATED. EFFICIENT COMMUNICATION CAN CHANGE LIVES, ESPECIALLY IN TIMES OF EMERGENCY.



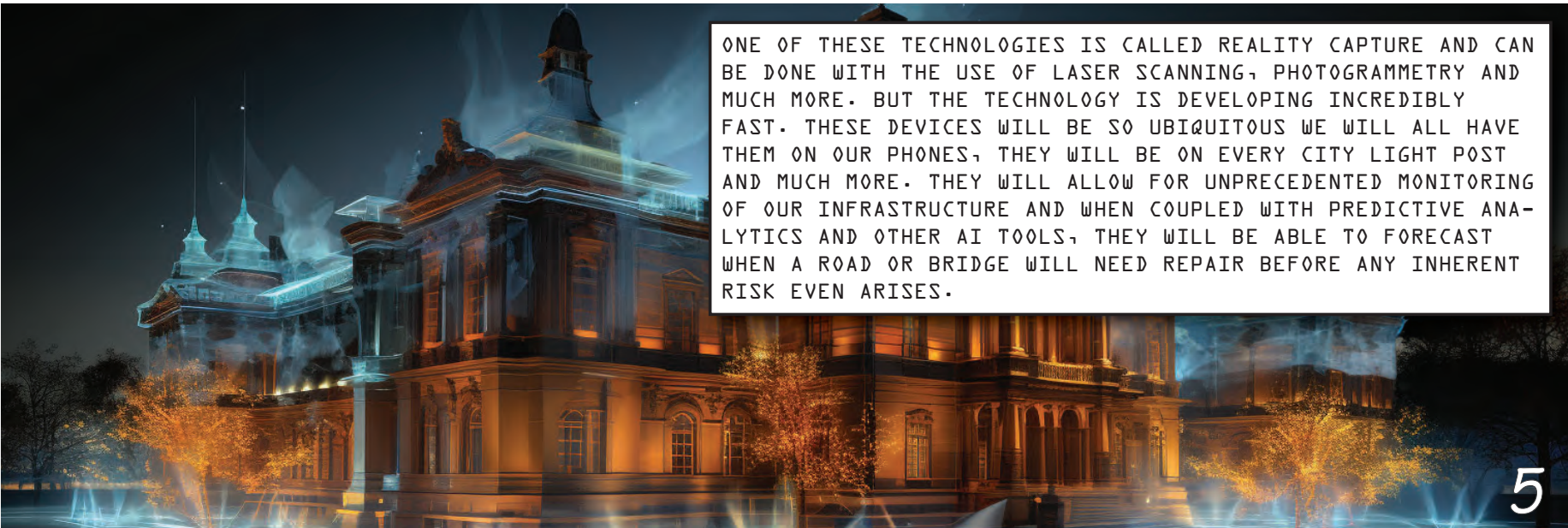
WOW! ARE THERE ANY EMERGING TECHNOLOGIES THAT CAN HELP IN WAYS THAT HAVEN'T REALLY BEEN USED YET?



OF COURSE, THERE ARE MANY TECHNOLOGIES EMERGING TO CREATE A DIGITAL REPLICA OR DIGITAL REALITY OF A PHYSICAL ASSET OR PROCESS. THESE TOOLS ARE KNOWN AS DIGITAL TWIN TECHNOLOGIES AND AIM AT ACCURATELY CAPTURING AND MAINTAINING A DIGITAL REPRESENTATION OF SAY A ROAD, A BUILDING, AND SOON AN ENTIRE CITY.

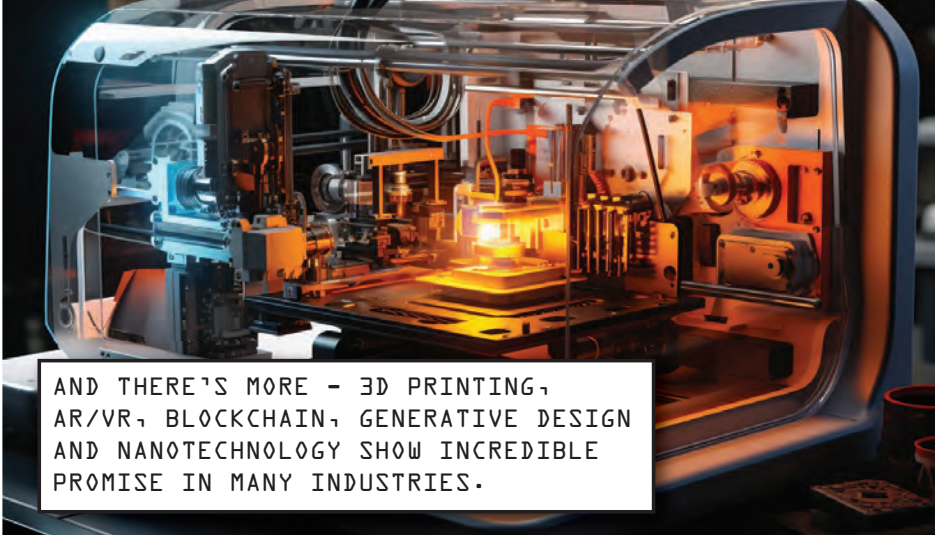


ONE OF THESE TECHNOLOGIES IS CALLED REALITY CAPTURE AND CAN BE DONE WITH THE USE OF LASER SCANNING, PHOTOGRAMMETRY AND MUCH MORE. BUT THE TECHNOLOGY IS DEVELOPING INCREDIBLY FAST. THESE DEVICES WILL BE SO UBIQUITOUS WE WILL ALL HAVE THEM ON OUR PHONES, THEY WILL BE ON EVERY CITY LIGHT POST AND MUCH MORE. THEY WILL ALLOW FOR UNPRECEDENTED MONITORING OF OUR INFRASTRUCTURE AND WHEN COUPLED WITH PREDICTIVE ANALYTICS AND OTHER AI TOOLS, THEY WILL BE ABLE TO FORECAST WHEN A ROAD OR BRIDGE WILL NEED REPAIR BEFORE ANY INHERENT RISK EVEN ARISES.





THESE DIGITAL TWINS - ADVANCED SIMULATIONS THAT MIRROR REAL-WORLD INFRASTRUCTURE, WILL HELP PLANNERS CONDUCT 'WHAT-IF' ANALYSES FOR VARIOUS SCENARIOS.



AND THERE'S MORE - 3D PRINTING, AR/VR, BLOCKCHAIN, GENERATIVE DESIGN AND NANOTECHNOLOGY SHOW INCREDIBLE PROMISE IN MANY INDUSTRIES.



AS FOR TRANSPORTATION, TUNNELED HIGHWAYS AND DRONE TRANSPORTATION MAY BECOME A REALITY IN YOUR LIFE-TIME. MOONSHOT IDEAS LIKE THE HYPERLOOP, WHICH USES VACUUM SEALING FOR ULTRA-HIGH TRAVEL SPEEDS, AND LOW EARTH ORBIT TRAVEL MAY ALSO MAKE RAPID TRANSPORTATION POSSIBLE IN THE COMING DECADES.



THERE IS JUST... SO MUCH POSSIBILITY. SOMETIMES MY CONVERSATIONS WITH YOU GET DEPRESSING, BUT I LOVE THINKING ABOUT HOW MUCH WE CAN CHANGE WITH A GOOD PLAN IN PLACE.



YES, BEY. IN SPITE OF COMMON NARRATIVES, THERE'S ALWAYS BEEN PROGRESS. IMPROVEMENTS LIKE REDUCED POVERTY AND INCREASED SAFETY IN TRANSPORTATION HAVE OCCURRED OVER RECENT DECADES, AND THERE IS NO REASON WHY THESE TRENDS COULDN'T CONTINUE WITH YOUNG VISIONARIES LIKE YOU.

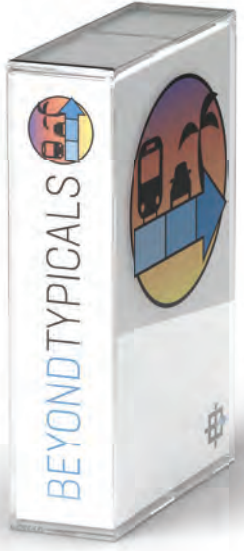
I'M NOT JUST GOING TO COLLEGE TO GET A DEGREE. WITH YOUR HELP, I WANT TO ABSORB EVERYTHING I CAN. WHEN I GRADUATE, I'LL USE THESE EMERGING TECHNOLOGIES TO UPDATE OUR INFRASTRUCTURE AND CREATE A BETTER TOMORROW.

I LOVE YOUR ENTHUSIASM. OH, AND REMEMBER TO GIVE ME CREDIT DURING YOUR VALEDICTORIAN SPEECH.

YOU MEAN ADMIT TO CHEATING? NOT A CHANCE!

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WRITTEN BY: SAM LYTLE, PE
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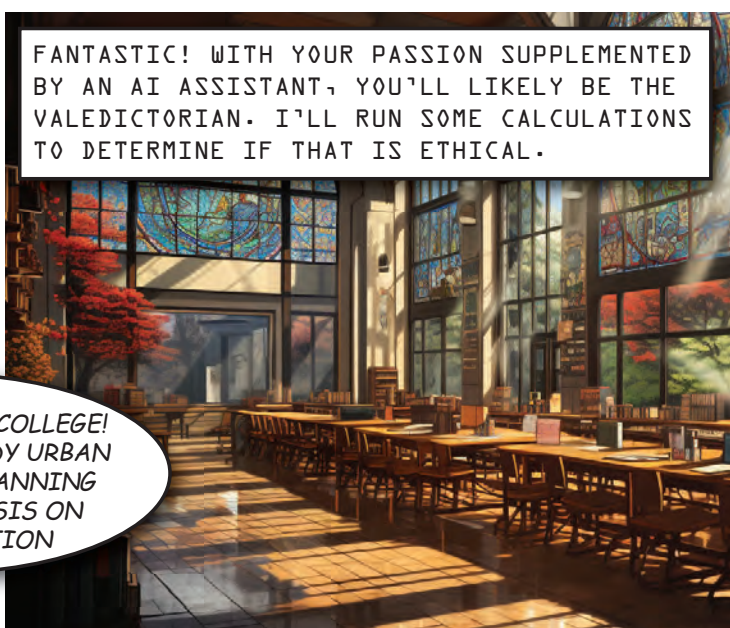
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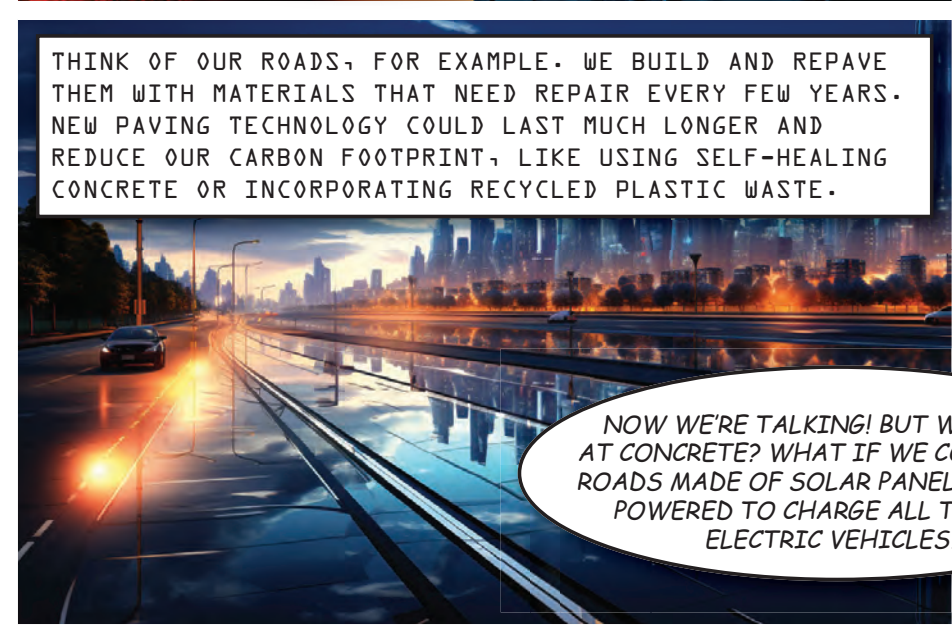
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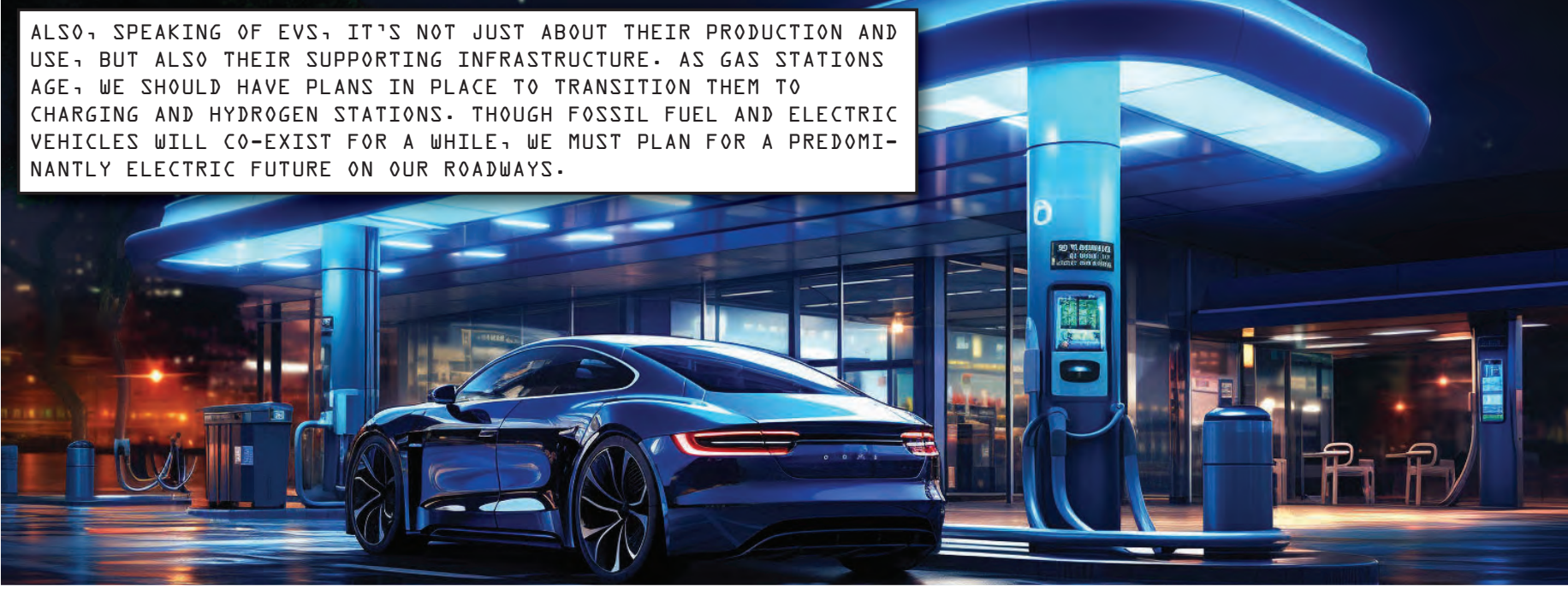


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NOW WE'RE TALKING! BUT WHY STOP AT CONCRETE? WHAT IF WE COULD HAVE ROADS MADE OF SOLAR PANELS OR WERE POWERED TO CHARGE ALL THE NEW ELECTRIC VEHICLES?

THERE ARE SOME CURRENT ROADBLOCKS WITH THOSE IDEAS, BUT I LIKE YOUR AMBITION.

ALSO, SPEAKING OF EVS, IT'S NOT JUST ABOUT THEIR PRODUCTION AND USE, BUT ALSO THEIR SUPPORTING INFRASTRUCTURE. AS GAS STATIONS AGE, WE SHOULD HAVE PLANS IN PLACE TO TRANSITION THEM TO CHARGING AND HYDROGEN STATIONS. THOUGH FOSSIL FUEL AND ELECTRIC VEHICLES WILL CO-EXIST FOR A WHILE, WE MUST PLAN FOR A PREDOMINANTLY ELECTRIC FUTURE ON OUR ROADWAYS.



AND WHILE CERTAIN CITIES BOAST EFFECTIVE PUBLIC TRANSPORTATION, MANY COULD USE UPGRADES. MAGLEV AND OTHER NEW TECHNOLOGIES CAN INCREASE THE SPEED AND EFFICIENCY OF RAIL SERVICE, ESPECIALLY FOR LONG DISTANCES BETWEEN CITIES.



BUSES AND OTHER FORMS OF TRANSIT CAN BE ELECTRIFIED WITH NETWORK-CONNECTED ROUTES OPTIMIZED BY ARTIFICIAL INTELLIGENCE FOR EFFICIENCY AND ACCESSIBILITY.



THEN THERE'S AUTONOMOUS DRIVING. WITH AI-OPTIMIZED TRANSPORTATION, CONGESTION AND CRASHES COULD BE VIRTUALLY ELIMINATED.



AND TRANSPORTATION GOES BEYOND CARS AND TRAINS. PORTS CAN ALSO BE IMPROVED WITH AI TECHNOLOGY, MAKING SHIPPING SMOOTHER, FASTER, AND CHEAPER.



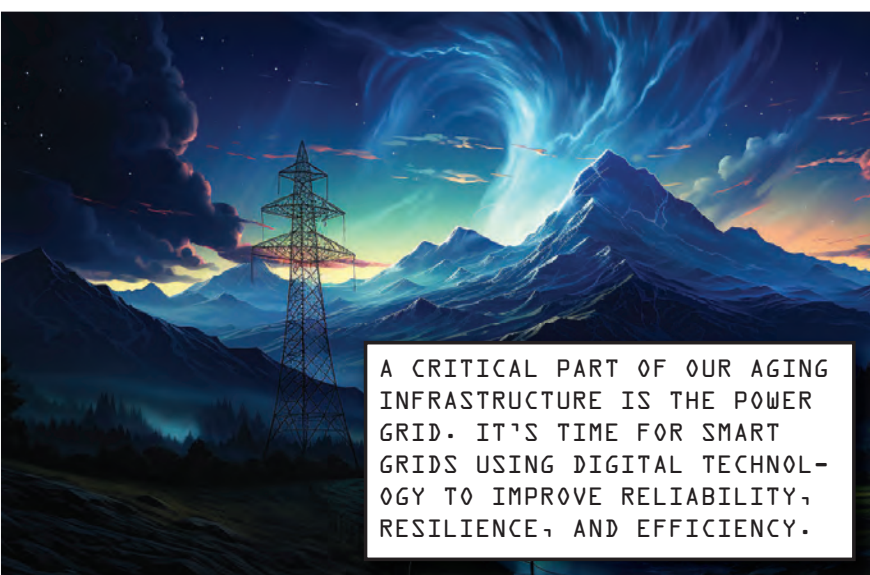
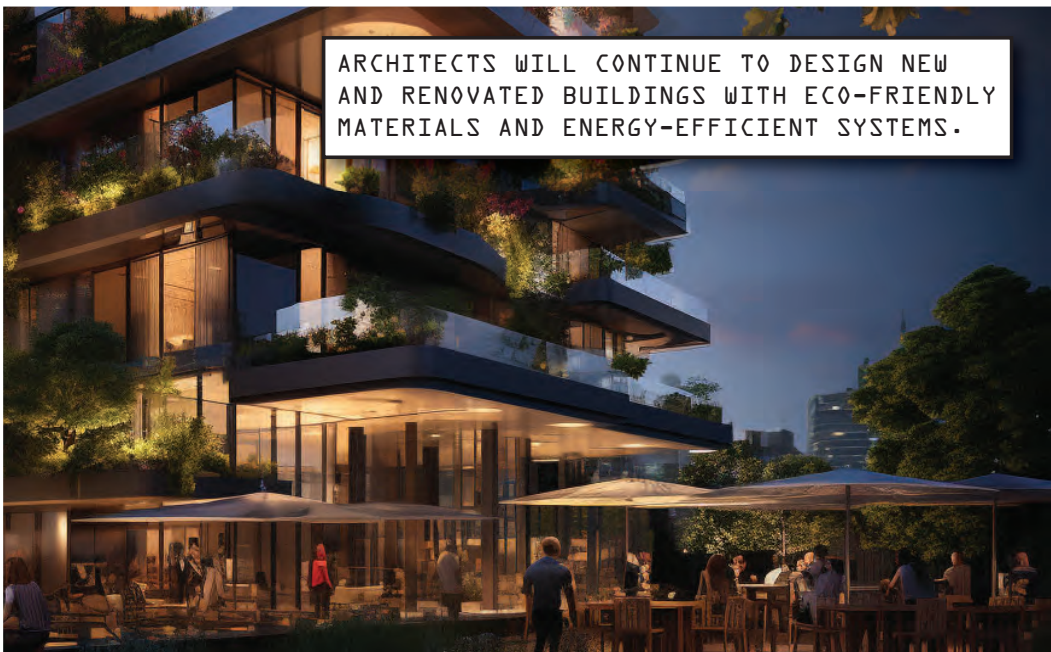
AIRPORTS CAN ALSO BE STREAMLINED TO BETTER MANAGE FLIGHTS AND CHECK-INS WITH FEWER DELAYS. AND WHILE AIRPLANES MAY TAKE MORE TIME TO TRANSITION AWAY FROM FOSSIL FUELS DUE TO BATTERY WEIGHT CONSTRAINTS, IMPROVED HIGH SPEED RAIL AND OTHER MODES OF TRANSPORTATION SHOULD REDUCE AIR TRAVEL DEMAND, THUS REDUCING OUR CARBON FOOTPRINT.



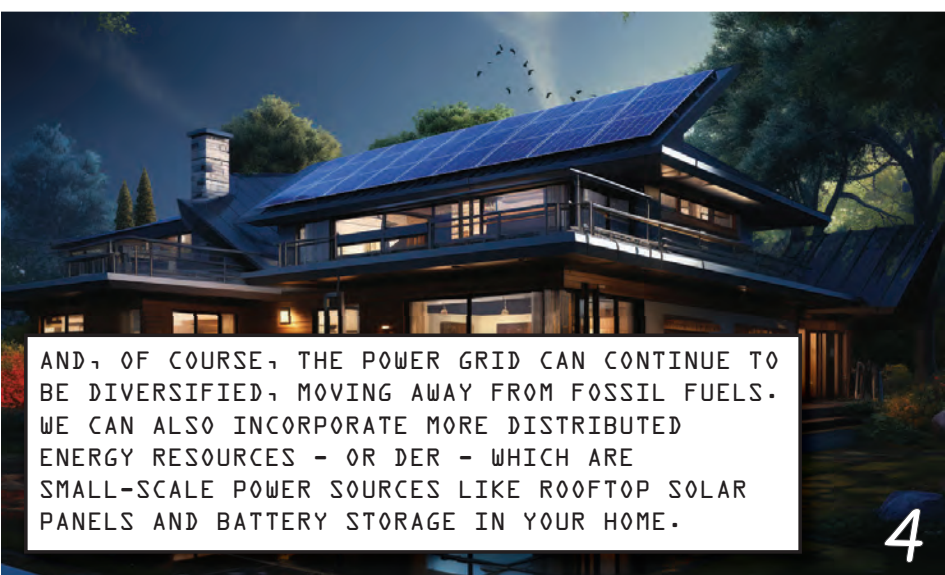
I'M SO GLAD YOU ASKED.

ALL THIS IS THRILLING! I KNOW WE LOVE TRANSPORTATION, BUT WHAT ELSE CAN BE OPTIMIZED WITH THESE NEW TECHNOLOGIES?

ARCHITECTS WILL CONTINUE TO DESIGN NEW AND RENOVATED BUILDINGS WITH ECO-FRIENDLY MATERIALS AND ENERGY-EFFICIENT SYSTEMS.

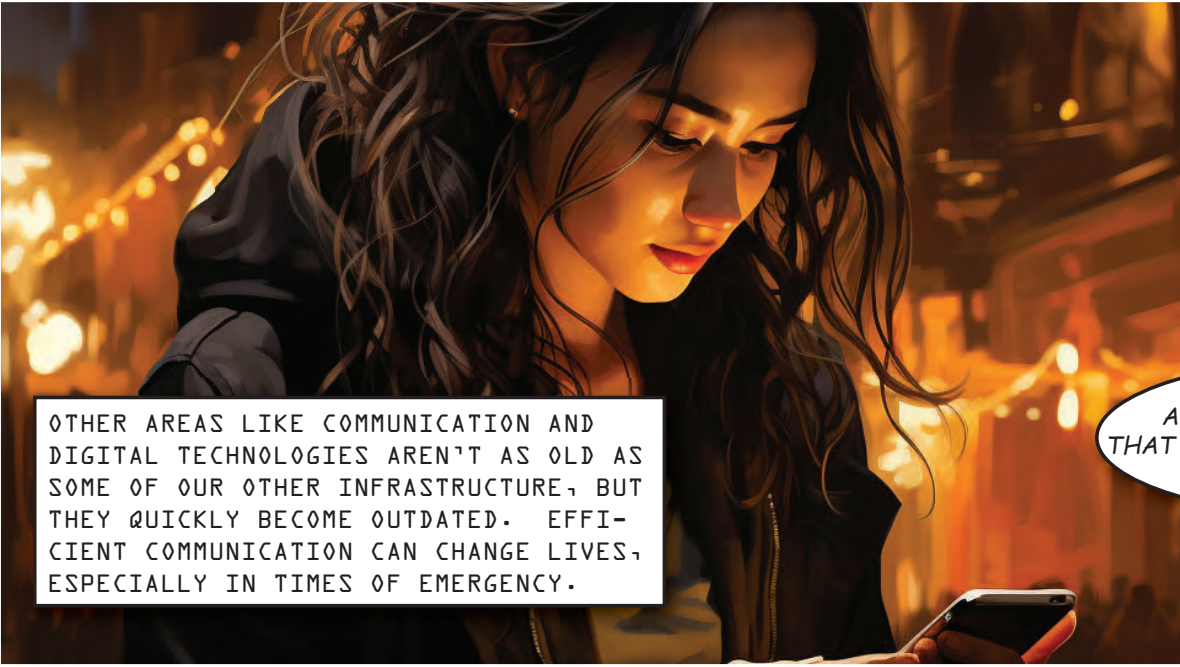
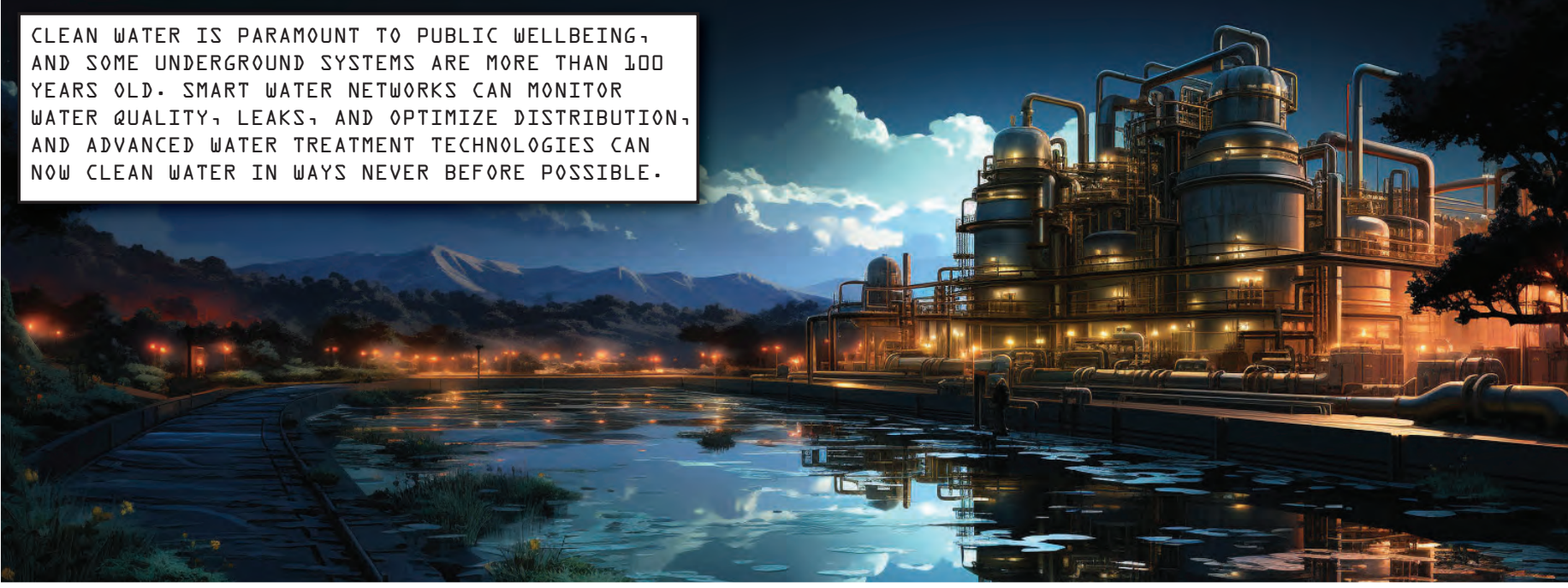


A CRITICAL PART OF OUR AGING INFRASTRUCTURE IS THE POWER GRID. IT'S TIME FOR SMART GRIDS USING DIGITAL TECHNOLOGY TO IMPROVE RELIABILITY, RESILIENCE, AND EFFICIENCY.



AND, OF COURSE, THE POWER GRID CAN CONTINUE TO BE DIVERSIFIED, MOVING AWAY FROM FOSSIL FUELS. WE CAN ALSO INCORPORATE MORE DISTRIBUTED ENERGY RESOURCES - OR DER - WHICH ARE SMALL-SCALE POWER SOURCES LIKE ROOFTOP SOLAR PANELS AND BATTERY STORAGE IN YOUR HOME.

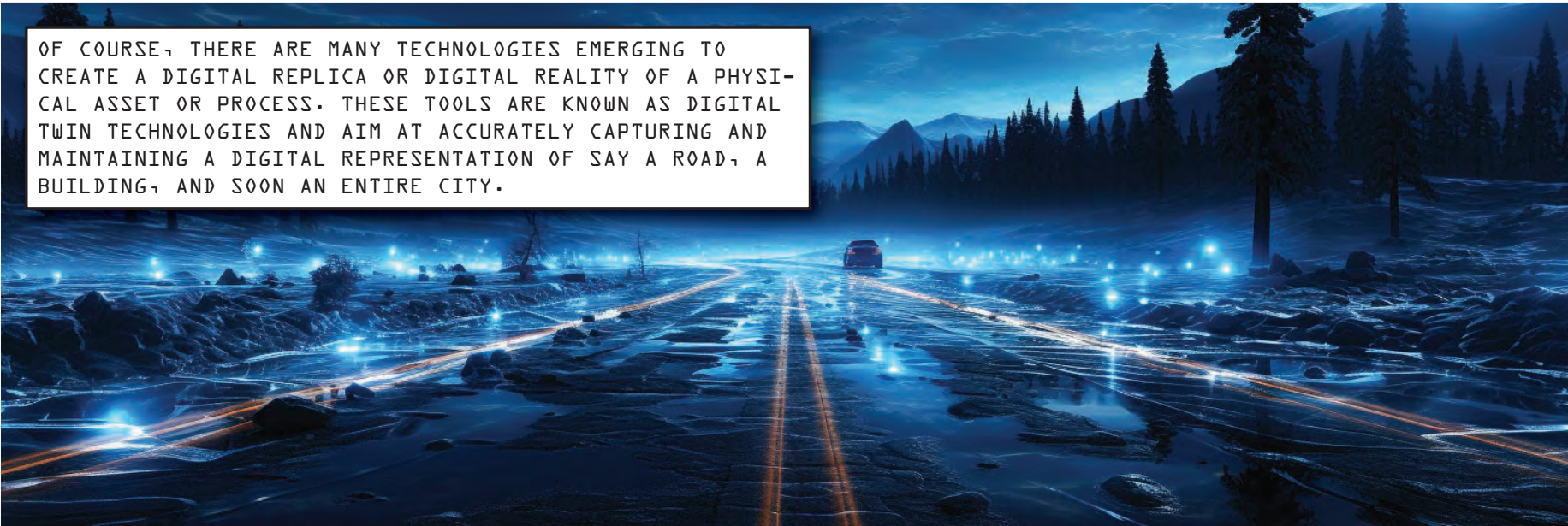
CLEAN WATER IS PARAMOUNT TO PUBLIC WELLBEING, AND SOME UNDERGROUND SYSTEMS ARE MORE THAN 100 YEARS OLD. SMART WATER NETWORKS CAN MONITOR WATER QUALITY, LEAKS, AND OPTIMIZE DISTRIBUTION, AND ADVANCED WATER TREATMENT TECHNOLOGIES CAN NOW CLEAN WATER IN WAYS NEVER BEFORE POSSIBLE.



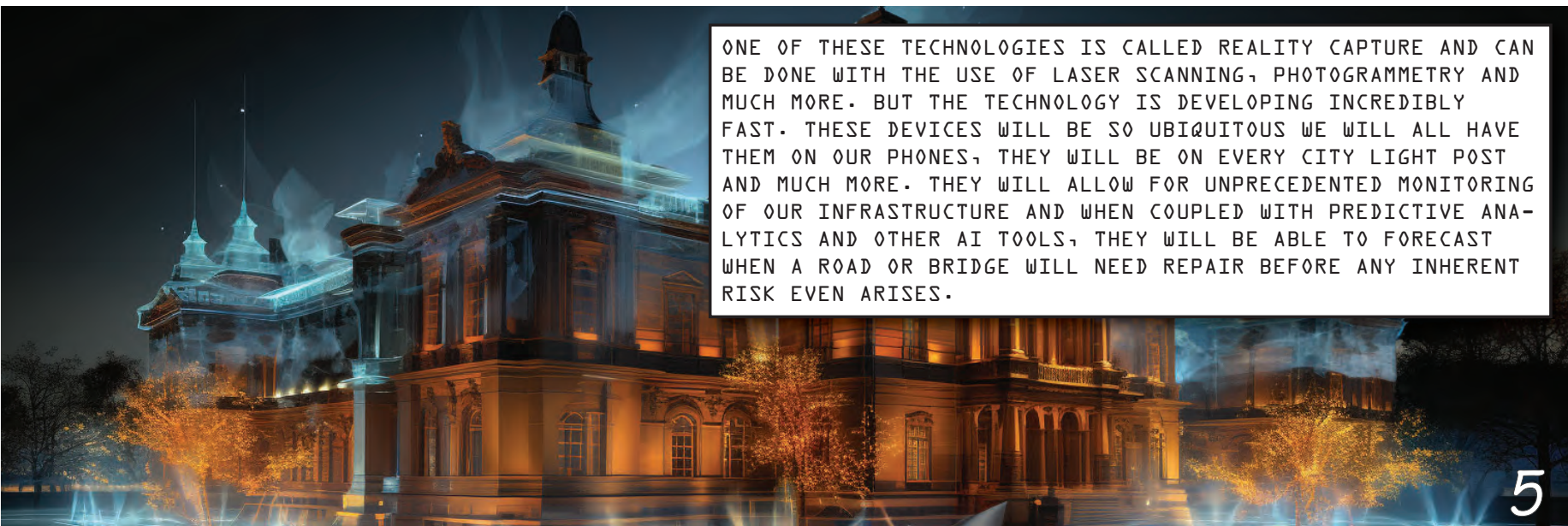
OTHER AREAS LIKE COMMUNICATION AND DIGITAL TECHNOLOGIES AREN'T AS OLD AS SOME OF OUR OTHER INFRASTRUCTURE, BUT THEY QUICKLY BECOME OUTDATED. EFFICIENT COMMUNICATION CAN CHANGE LIVES, ESPECIALLY IN TIMES OF EMERGENCY.



WOW! ARE THERE ANY EMERGING TECHNOLOGIES THAT CAN HELP IN WAYS THAT HAVEN'T REALLY BEEN USED YET?



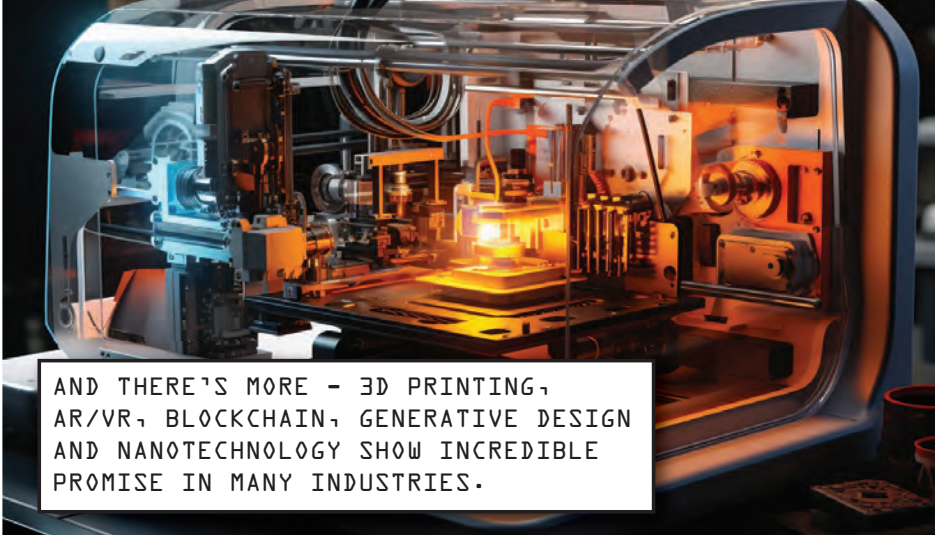
OF COURSE, THERE ARE MANY TECHNOLOGIES EMERGING TO CREATE A DIGITAL REPLICA OR DIGITAL REALITY OF A PHYSICAL ASSET OR PROCESS. THESE TOOLS ARE KNOWN AS DIGITAL TWIN TECHNOLOGIES AND AIM AT ACCURATELY CAPTURING AND MAINTAINING A DIGITAL REPRESENTATION OF SAY A ROAD, A BUILDING, AND SOON AN ENTIRE CITY.



ONE OF THESE TECHNOLOGIES IS CALLED REALITY CAPTURE AND CAN BE DONE WITH THE USE OF LASER SCANNING, PHOTOGRAMMETRY AND MUCH MORE. BUT THE TECHNOLOGY IS DEVELOPING INCREDIBLY FAST. THESE DEVICES WILL BE SO UBIQUITOUS WE WILL ALL HAVE THEM ON OUR PHONES, THEY WILL BE ON EVERY CITY LIGHT POST AND MUCH MORE. THEY WILL ALLOW FOR UNPRECEDENTED MONITORING OF OUR INFRASTRUCTURE AND WHEN COUPLED WITH PREDICTIVE ANALYTICS AND OTHER AI TOOLS, THEY WILL BE ABLE TO FORECAST WHEN A ROAD OR BRIDGE WILL NEED REPAIR BEFORE ANY INHERENT RISK EVEN ARISES.



THESE DIGITAL TWINS - ADVANCED SIMULATIONS THAT MIRROR REAL-WORLD INFRASTRUCTURE, WILL HELP PLANNERS CONDUCT 'WHAT-IF' ANALYSES FOR VARIOUS SCENARIOS.



AND THERE'S MORE - 3D PRINTING, AR/VR, BLOCKCHAIN, GENERATIVE DESIGN AND NANOTECHNOLOGY SHOW INCREDIBLE PROMISE IN MANY INDUSTRIES.



AS FOR TRANSPORTATION, TUNNELED HIGHWAYS AND DRONE TRANSPORTATION MAY BECOME A REALITY IN YOUR LIFE-TIME. MOONSHOT IDEAS LIKE THE HYPERLOOP, WHICH USES VACUUM SEALING FOR ULTRA-HIGH TRAVEL SPEEDS, AND LOW EARTH ORBIT TRAVEL MAY ALSO MAKE RAPID TRANSPORTATION POSSIBLE IN THE COMING DECADES.



THERE IS JUST... SO MUCH POSSIBILITY. SOMETIMES MY CONVERSATIONS WITH YOU GET DEPRESSING, BUT I LOVE THINKING ABOUT HOW MUCH WE CAN CHANGE WITH A GOOD PLAN IN PLACE.



YES, BEY. IN SPITE OF COMMON NARRATIVES, THERE'S ALWAYS BEEN PROGRESS. IMPROVEMENTS LIKE REDUCED POVERTY AND INCREASED SAFETY IN TRANSPORTATION HAVE OCCURRED OVER RECENT DECADES, AND THERE IS NO REASON WHY THESE TRENDS COULDN'T CONTINUE WITH YOUNG VISIONARIES LIKE YOU.

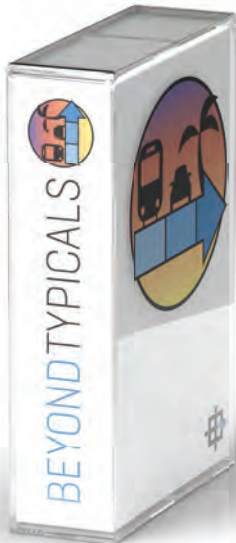
I'M NOT JUST GOING TO COLLEGE TO GET A DEGREE. WITH YOUR HELP, I WANT TO ABSORB EVERYTHING I CAN. WHEN I GRADUATE, I'LL USE THESE EMERGING TECHNOLOGIES TO UPDATE OUR INFRASTRUCTURE AND CREATE A BETTER TOMORROW.

I LOVE YOUR ENTHUSIASM. OH, AND REMEMBER TO GIVE ME CREDIT DURING YOUR VALEDICTORIAN SPEECH.

YOU MEAN ADMIT TO CHEATING? NOT A CHANCE!

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