AEESP Converging COVID-19, environment, health, & equity conference

Session 5 Transcript – November 13, 2020

GOOD AFTERNOON, EVERYONE.
AND WELCOME TO AEESP CONVERGING COVID-19, ENVIRONMENT, HEALTH AND EQUITY.
MY NAME IS MAYA TROTZ AND I AM THE CO-CHAIR OF THIS CONFERENCE.
AND I WOULD REALLY LIKE TO WELCOME YOU TO OUR FIFTH SESSION, WHICH LOOKS AT DESIGNING A FUTURE WITHOUT POLLUTION AND WASTE.
SOME LOGISTICS WE ARE RECORDING THIS WEBINAR.
SO WITH THIS ANNOUNCEMENT YOU ARE BEING RECORDED.
SOME DIRECTIONS FOR TODAY, THE BEST WAY TO LOOK AT THE WEBINAR IS TO DO SIDE BY SIDE VIEW ON YOUR SCREEN.
SO THIS IS SOMETHING THAT YOU CONTROL ON YOUR COMPUTER.
FOR SOME OF YOU THIS IS A DROPDOWN MENU THAT YOU WOULD USE TO CLICK THAT.
WE DO HAVE SIGN LANGUAGE INTERPRETATION.
SO THAT'S BEST SEEN IN SIDE BY SIDE MODE.
WE ALSO HAVE CLOSED CAPTIONING, WHICH YOU CAN ADJUST AT THE BOTTOM OF YOUR ZOOM PANEL.
WE WANT YOU TO ASK QUESTIONS FOR OUR PANELISTS.
SO WE ENCOURAGE TO YOU SEND THEM THROUGH THE Q&A.
IF YOU ARE WATCHING ON YOUTUBE LIVE YOU CAN ALSO POST QUESTIONS THERE OR TWEET US WITH A #AEESP CONVERGING COVID-19.
NOW I WOULD LIKE TO PLAY A SHORT VIDEO WELCOMING YOU TO OUR CONFERENCE.
[¶¶¶]
I WOULD NOW LIKE TO INTRODUCE OUR MODERATOR, DR. COLLEEN NAUGHTON.
DR. NAUGHTON IS ALSO THE CONFERENCE CO-CHAIR PERSON AND CO-PI.
SHE IS AN ASSISTANT PROFESSOR IN CIVIL AND ENVIRONMENTAL ENGINEERING AT THE UNIVERSITY OF CALIFORNIA MERCED, AND SERVES ON THE AEESP GOVERNMENT AFFAIRS COMMITTEE MEMBER, AND FORMER SCIENCE AND TECHNOLOGY POLICY FELLOW THROUGH THE AMERICAN ASSOCIATION FOR ADVANCEMENT OF SCIENCE.
SHE LOOKS AT SUSTAINABLE FOOD SUSTAINABLE WATER SYSTEMS AND SHE IS REALLY BRAIN CHILD BEHIND THIS CONFERENCE.
SO I WILL ASK DR. NAUGHTON TO TAKE IT OVER FROM HERE.
>> THANK YOU, DR. TROTZ FOR THAT KIND INTRODUCTION.
I WOULD SAY YOU ARE THE BRAIN CHILD OF THIS CONFERENCE, BUT THANK YOU FOR THE THOUGHTS.
SO WELCOME, EVERYONE.
GOOD MORNING.
GOOD AFTERNOON OR GOOD EVENING, DEPENDING WHEN YOU ARE WATCHING THIS.

I WOULD FIRST LIKE TO PAUSE TO ACKNOWLEDGE ALL LOCAL INDIGENOUS PEOPLES, INCLUDING THE YOKUTS AND MIWUK, WHO INHABITED THE LAND OF THE UNIVERSITY OF CALIFORNIA MERCED.
WE EMBRACE THEIR CONTINUED CONNECTION TO THIS REGION AND THANK THEM FOR ALLOWING US TO LIVE, WORK, LEARN AND COLLAB RAITT ON THEIR TRADITIONAL HOMELAND.
NEXT I WOULD LIKE TO DEDICATE THIS SESSION TO MY GRANDMOTHER OR NANA.
HER NAME WAS MARION JAROSKE, AND SHE PASSED PAY WAY THIS TUESDAY.
SHE WOULD HAVE APPRECIATED THIS SESSION ON DESIGNING A FUTURE WITHOUT PLUGS OR WASTE.
SHE WAS ONE OF THE FIRST TO TEACH ME ABOUT THE ENVIRONMENT.
I REMEMBER HOW SHE WOULD CLEAN ALL OF HER RECYCLABLES AND NEATLY BIND THE PAPERS AND SEPARATE PAPER, PLASTIC AND METAL BEFORE WE HAD SINGLE STREAM RECYCLING.
SHE WAS ALSO A YOUNG GIRL GROWING UP AFTER THE GREAT DEPRESSION, AND SHE REALLY DID NOT LIKE TO WASTE ANYTHING, FOOD OR MATERIAL.
SHE DID NOT LIVE TO SEE A FUTURE WITHOUT POLLUTION OR WASTE, BUT HOPEFULLY HER GRANDCHILD, MYSELF AND THOSE AFTER SHE WILL LIVE TO SEE A FUTURE WITHOUT POLLUTION OR WASTE.
ACCORDING TO THE WORLD BANK, THE WORLD GENERATION 2 BILLION TONS OF MUNICIPAL SOLID WASTE ANNUALLY.
ONE THIRD OF WHICH ARE NOT PROPERLY MANAGED -- OR MANAGED SAFELY.
EVERY YEAR AN ESTIMATED ONE THIRD OF FOOD PRODUCED IS WASTED, EQUIVALENT TO 1.3 BILLION TONS BY CONSUMERS RETAILERS AND FROM INEFFICIENT TRANSPORTATION AND HARVESTING PRACTICES.
IN 2015, ONE IN EVERY SIX DEATHS WAS ATTRIBUTED TO A DISEASE FROMMICS EXPOSURE TO POLLUTION.
AIR POLLUTION IN PARTICULAR CAUSES 7 MILLION PREMATURE DEATHS WORLDWIDE.
AND THERE'S 300 MILLION TONS OF PLASTIC WASTE PRODUCED EVERY YEAR ACCORDING TO THE UNITED NATIONS ENVIRONMENT PROGRAM.
COVID-19 HAS CAUSED FURTHER CHALLENGES FOR POLLUTION AND WASTE.
THE FOOT SUPPLY CHAIN WAS DISRUPTED AND TONS OF CROPS WERE OVERTURNED.
MILLIONS OF GALLONS OF MILK WERE DUMPED AND MILLIONS OF HOGS WERE YOU'VIZED PREMATURELY.
WE'VE SEEN AN EXPLOSION OF PERSONAL PROTECTIVE EQUIPMENT AND LITTER AND WASTE, AND GLOVES AND MASKS MADE OUT OF PETIUM PRODUCTS ALREADY TURNING UP IN OUR OCEAN, STREAMSES AND RIVERS.
THOUGH INITIAL LOCKDOWNS DECREASED SOME AIR POLLUTANTS IT DID NOT REDUCE ALL AND STUDIES SHOW THAT EXPOSURE TO AIR POLLUTION CAN MAKE PEOPLE MORE SUSCEPTIBLE TO COVID-19 AND MORE SERIOUS ILLNESS.
DESPITE THESE SOBERING STATISTICS, THERE ARE SOLUTIONS.
TODAY WE HAVE AN AMAZING PANEL LINED UP TO TOUCH ON MANY DIFFERENT ASPECTS OF THE GRAND CHALLENGES TO DESIGN A FUTURE WITHOUT POLLUTION OR WASTE.
FROM DIFFERENT APPROACHES TO SOLID WASTE MANAGEMENT DURING COVID-19, WORKING WITH COMMUNITIES AND INNOVATING FOOD AND WASTE WATER, AIR POLLUTION DURING COVID-19, PARTICULARLY FOR UNDERSERVED COMMUNITIES, TRANSPORTATION AND DECARBONIZING DURING THE UNCERTAINTY OF COVID-19, AND A FUTURE WITH GREEN CHEMISTRY.
SO I WOULD LIKE TO INTRODUCE THE FIRST SPEAKER, DR. CESUNICA IVEY.
DR. IVEY IS AN ASSISTANT PROFESSOR OF CHEMICAL AND ENVIRONMENTAL ENGINEERING AT THE UNIVERSITY OF CALIFORNIA RIVERSIDE.

HER RESEARCH CENTERS ON DEVELOPING AND APPLYING ADVANCED AIR QUALITY MODELING AND DATA FUSION APPROACHES TO CHARACTERIZE AIR POLLUTION IN THE UNITED STATES.
THESE ADVANCED APPROACHES ARE USED TO ANSWER QUESTIONS RELATED TO COMMUNITY-SCALE EXPOSURE AND SOURCE CHARACTERIZATION.
SO PLEASE JOIN ME IN WELCOMING DR. IVEY.
>> GOOD MORNING.
I'M DR. CESUNICA IVEY, A THIRD-YEAR PROFESSOR OF CHEMICAL ENGINEERING AT U OF C RIVERSIDE.
TODAY I'M GOING TO BRIEFLY DISCUSS THE ABILITY AND TREND OF THE COVID-19 SHUTDOWN FOLLOWED BY THE IMPLICATIONS OF THESE ACTIVITY CHANGES FOR AIR POLLUTION, FUTURE MILTGATION AND HOW THESE FACTORS ARE DISPROPORTIONATELY IMPACTING ENVIRONMENTAL JUSTICE COMMUNITIES.
NEXT, PLEASE.
SO IT'S WELL KNOWN BY NOW THAT THE COVID-19 SHUTDOWN LED TO SUBSTANTIAL CHANGES IN HUMAN ACTIVITY, SUCH AS THE REDUCTION IN VEHICLE MILES TRAVELLED, AIR TRAVEL, INDUSTRIAL PRODUCTION AND BUILDING ENERGY CONSUMPTION.
MORE LOCALLY IN SOUTHERN CALIFORNIA PEAK PRODUCTIONS IN VEHICLE MILES TRAVELLED OCCURRED IN MID-APRIL AND GRADUALLY BEGAN TO REBOUND.
PRESENTLY TRAFFIC FLOW HAS NOT RETURNED TO PRECOVID LEVELS IN THE SOUTH COAST AIRBASE INN.
AND WE ALSO SAW THAT TRAFFIC REDUCTIONS WERE NOT SPATIALLY UNIFORM.
WHERE COASTAL COUNTIES SAW GREATER REDUCTIONS THAN THE INLAND COUNTIES.
POTENTIALLY THIS IS DUE TO A HIGHER FRACTION OF ESSENTIAL WORKERS IN THE INLAND COUNTIES.
NEXT SLIDE, PLEASE.
SO THE LOS ANGELES BASIN HAS A UNIQUE COMBINATION OF METEOROLOGY ATMOSPHERIC CHEMISTRY AND TOPOGRAPHY THAT MAKE OUR REGION SUSCEPTIBLE TO HIGHER LEVELS OF AIR POLLUTION OF WHILE PRIMARY AIR POLLUTION SUCH AS TAIL PIPE EMISSIONS HAVE MORE LOCAL IMPACTS, SECONDARY POLLUTION SUCH AS OZONE AND SECONDARY PM CAN BE MORE SPATIALLY HOMOGENEOUS WITHIN SEVERAL THOUSAND METERS.
OUR SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT CARRIES OUT REGULAR STUDIES OF CANCER RISK IN THE BASIN, FORMERLY KNOWN AS THE MAY STUDIES AND WHAT THEY FOUND WAS THE RISK PER MILLION FOR CANCER ACTUALLY STRONGLY COINCIDES WITH HIGHWAYS AND INTERMODAL TRANSPORT FACILITIES SUCH AS RAIL YARDS AND SHIPPING PORTS.
SO IN RECENT -- IN RECENT YEARS, THE STATE OF CALIFORNIA ACTUALLY MANDATED THAT WE INCREASE THE RESOURCES THAT SHOULD BE INVESTED TO ADDRESS COMMUNITY EXPOSURE DISPARITIES.
WHICH ARE MOST OFTEN SEEN -- OR MOST OFTEN OBSERVED IN BLACK, BROWN AND INDIGENOUS COMMUNITIES IN SOUTHERN CALIFORNIA.
SO IN BOTH FIGURES ON THE RIGHT, I'VE ACTUALLY HIGHLIGHTED THE THREE PHASE 1 ENVIRONMENTAL JUSTICE COMMUNITIES.
AND OF PARTICULAR INTEREST IS THE WILMINGTON WEST LONG BEACH CARSELAND COMMUNITY AND THE GRAPHIC ON THE LEFT IS MODOLO AND PRESENTS A DISCOURAGING LOOK AT CASES IN THIS COMMUNITY.
THE CASES PER 100,000 PEOPLE ARE INDICATED BY THE DARK DOTS AND COLORED BY THE SCORE AND THE RED COLORS INDICATE THE TRACKS THAT HAVE MORE VULNERABLE COMMUNITIES.

SO WE CAN CLEARLY SEE THAT THE COVID CASES ARE HIGHEST IN THE MOST VULNERABLE CENSUS TRACTION.
HOWEVER THIS FIGURE ACTUALLY INSPIRES THIS FOLLOWING QUESTION:
OF.
GIVEN THAT AIR POLLUTION, EXPOSURE HAS BEEN IDENTIFIED AS AN IMPORTANT RISK FACTOR FOR COVID-19 MORTALITY, SPECIFICALLY FOR SECONDARY POLLUTION LIKE PM2.5, WHY AREN'T THE COVID CASES MORE HOMOGENEOUS IN THIS PARTICULAR AREA OF SOUTHERN CALIFORNIA?
PLEASE GO TO THE NEXT SLIDE.
SO THE ANSWER REALLY LIES IN INEQUITABLE LAND USE.
SO INEQUITABLE LAND USE IS ACTUALLY WHAT IS LEADING TO THESE HIGHER LEVELS OF PRIMARY AIR TOXIC EMISSIONS IN VULNERABLE COMMUNITIES.
SPECIFIC EXAMPLES OF THESE INCLUDE UPZONING IN BLACK, BROWN AND INDIGENOUS COMMUNITIES WHICH LEADS TO AN INFLUX OF HAZARDOUS FACILITIES INTO THE COMMUNITIES.
ANOTHER EXAMPLE IS THE DELIBERATE CONSTRUCTION OF HIGHWAYS IN VULNERABLE COMMUNITIES WHICH LEADS TO HIGHER EXPOSURES TRAFFIC RELATED POLLUTION. AND LAND-USE CHANGES NEAR RESIDENTIAL COMMUNITIES WILL DEGRADE AIR QUALITY AND GENERALLY DEGRADE EARLY CHILDHOOD EDUCATION DUE TO CHRONIC ILLNESSES.
IT LOWERS PROPERTY VALUES AND IT CONFINES VULNERABLE COMMUNITIES AND LYMPHS SOCIAL MOBILITY AND HINDERS THE FLEXIBILITY TO MIGRATE AWAY FROM THESE LOCATIONS.
SADLY THESE ARE ARTIFACTS OF RED LINING AFTER THE GREAT DEPRESSION.
NEXT SLIDE.
SO MOVING FORWARD WE NEED TO CONSIDER THE HISTORICAL CONTEXT OF INEQUITABLE LAND USE WHEN WE ARE ADDRESSING AIR POLLUTION EXPOSURE DISPARITIES.
FIRST WE NEED TO BE MORE AWARE OF THE DISPROPORTIONATE CONSUMPTION OF WASTE ACROSS DEMOGRAPHICS.
WHERE BLACK AND BROWN AND INDIGENOUS COMMUNITIES DEPEND RATE LESS POLLUTION BUT WERE EXPOSED TO MORE POLLUTION THAN WHITE COMMUNITIES.
MY TIME IS UP.
WE SHOULD ALSO PUSH FOR POLICIES THAT PENALIZE UNSUSTAINABLE DEVELOPMENT IN HISTORICALLY UNSERVED COMMUNITIES.
NEXT SLIDE, PLEASE.
FINALLY IN TERMS OF TECHNOLOGY, WE NEED TO PUSH FOR ZERO EMISSIONS THAT ELIMINATE TOXIC AIR POLLUTIONS WHICH WILL ACTUALLY BENEFIT ALL POPULATIONS.
FURTHER I THINK WE HAVE SEEN THAT WORKING FROM HOME WHENEVER POSSIBLE REDUCES THE DISPROPORTIONATE IMPACT OF TRAFFIC RELATED POLLUTANTS ON ALL COMMUNITIES.
AND WITH THAT PLEASE FEEL FREE TO CRACK ME IF YOU WOULD LIKE TO DISCUSS ANYTHING THAT I'VE PRESENTED TODAY.
>> THANK YOU, DR. IVEY FOR THAT GREAT PRESENTATION AND HIGHLIGHTING THE HISTORICAL INEQUITIES RELATED TO AIR POLLUTION.
NEXT I WOULD LIKE TO INTRODUCE OUR SECOND SPEAKER, DR. JUYEONG CHOI.
DR. CHOI IS AN ASSISTANT PROFESSOR AT THE DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING AT FAMU-FSU COLLEGE OF ENGINEERING.
HE LEADS THE SUSTAINABLE AND RESILIENT INFRASTRUCTURE LABORATORY TO ADDRESS EMERGING ISSUES FACING CRITICAL INFRASTRUCTURE SYSTEMS,
WHICH SPANS FROM AGING INFRASTRUCTURE TO CLIMATE CHANGE AND SUSTAINABILITY AND POST DISASTER RESILIENCY.

DR. CHOI RECEIVED AN NSF RAPID GRANT TO LOOK AT COVID-19 AND ITS IMPACT ON MUNICIPAL SOLID WASTE MANAGEMENT FACILITIES.
PLEASE JOIN ME IN WELCOMING OUR SECOND PANELIST, DR. CHOI.
>> THANK YOU, COLLEEN FOR YOUR KIND INTRODUCTION.
MY NAME IS JUYEONG CHOI.
AND IN THIS PRESENTATION I WOULD LIKE TO TALK ABOUT HOW WE CAN MAKE OUR WASTE MANAGEMENT SYSTEMS RESILIENT ENOUGH TO KEEP THE ENVIRONMENT CLEAN AND MINIMIZE THE POTENTIAL SPREAD OF THE INFECTIOUS DISEASE.
NEXT SLIDE, PLEASE.
SO OUR WASTE MANAGEMENT SERVICES ARE A KIND OF A SYSTEM WHICH CONSISTING OF MULTIPLE ENTITIES ASK THEIR INTERACTIONS.
FOR EXAMPLE -- NEXT...
ONCE WASTE IS COLLECTED BY EITHER RECYCLING TRUCKS, WASTE COLLECTORS OR PEOPLE FROM RESIDENTIAL AREAS AND LOCAL BUSINESSES, THE COLLECTED WASTE WILL PROCEED TO DIFFERENT FACILITIES SUCH AS TRANSPORT STATIONS AND LANDFILL SITES.
ALL OF THE DIFFERENT WASTE MANAGEMENT SYSTEMS OFFER SIMILAR SERVICES.
BUT THEIR SYSTEMS ARE UNIQUE IN TERMS OF WHAT ENTITIES EXIST IN THE SYSTEM, HOW THESE ENTITIES INTERACT WITH ONE ANOTHER, AND -- PLEASE CLICK.
NEXT.
WHO OWNS AND MANAGES THESE FACILITIES.
THE RESPONSIBILITY FOR THESE CHALLENGES, EACH SYSTEM HAS ADOPTED EACH SYSTEM DIFFERENTLY.
FOR INSTANCE, AS WE CAN SEE FROM THE SLIDE.
IN ORDER TIE ACCOMMODATE A SPIKE IN THE VOLUME OF RESIDENTIAL WASTE, SOME SYSTEMS STOPPED PICKING UP YARD WASTE AND FOCUSED THEIR RESOURCES ON THE COLLECTION OF RESIDENTIAL WASTE.
WHICH RESULTED IN A CHANGE IN THE INTERACTION BETWEEN WASTE COLLECTORS AND RESIDENTIAL CUSTOMERS.
ALSO -- NEXT, PLEASE.
DUE TO THE LIMITED OF PPE FOR WASTE WORKERS, OTHER LOCAL GOVERNMENT AGENCIES AND VOLUNTEER ORGANIZATIONS BECAME IMPORTANT PART OF THE SYSTEM.
NEXT SLIDE, PLEASE.
LET'S TAKE A LOOK AT TWO SYSTEMS.
ONE SYSTEM IN FLORIDA AND THE OTHER ONE IN CALIFORNIA AND COMPARE THEM TO SEE HOW THEY HAVE RESPONDED DIFFERENTLY DURING THE PANDEMIC.
THIS IS ONE OF THE WASTE MANAGEMENT SYSTEMS IN FLORIDA.
AS YOU CAN SEE IN THIS SLIDE.
THE WASTE TO ENERGY FACILITIES IS THE PRIMARY MEANS OF DISPOSAL TO THE SYSTEM.
FROM THE WASTE COMMERCIAL SOURCE, COMMERCE AND RESIDENTIAL WASTE IS COLLECTED IN TWO WAYS.
TRANSPORT BY CUSTOMERS THEMSELVES TO THE COLLECTION POINT AND TO THE COLLECTION BY THE WASTE COLLECTORS.
NEXT SLIDE, PLEASE.
IN THE BEGINNING OF THE PANDEMIC, AROUND APRIL, THIS SYSTEM FACED LOTS OF CHALLENGES AND HAD TO TAKE A LOT OF MEASURES.
NEXT, PLEASE.
IN PARTICULAR THERE WAS SUSPENSION OF HOUSEHOLD WASTE SERVICES DUE TO THE DIFFICULTY IN MAINTAINING SOCIAL DISTANCES.
AND ALSO -- NEXT.

MATERIAL RECOVERED FACILITIES WERE SUSPENDED AND OTHER RECYCLABLES WERE DIVERTED TO A WASTE ENERGY FACILITY DUE TO THE CONCERN ABOUT RECYCLING CONTAMINATION.
SOME INTERACTIONS BETWEEN ENTITIES WERE REMOVED AS YOU CAN SEE IN THIS SLIDE.
NEXT SLIDE, PLEASE.
NOW LET'S LOOK AT THE SECOND SYSTEM IN CALIFORNIA.
THERE ARE THREE MAIN SOURCES OF THE WASTE STREAM.
RESIDENTIAL, COMMERCIAL AND INDUSTRIAL ROLLOFF.
PLEASE NOTE THAT UNLIKE SYSTEM ONE, THIS SYSTEM MAINLY RELIES ON MATERIAL RECOVERY FACILITY AND COMPOSTING FACILITY THROUGH TO INCOMING WASTE AND DOES NOT HAVE A WASTE ENERGY FACILITY IN THE SYSTEM SINCE CALIFORNIA DOES NOT ALLOW FOR HAVING THE WASTE FACILITIES IN THE SYSTEM.
NEXT, PLEASE.
LIKE SYSTEM 1 IN FLORIDA THIS SYSTEM ALSO EXPERIENCED LOTS OF CHALLENGES AND VARIOUS OTHER MEASURES IN THE BEGINNING OF THE PANDEMIC.
BUT UNLIKE SYSTEM 1, THERE WAS NO CHANGE IN INTERACTIONS BETWEEN SYSTEM ENTITIES.
IN PARTICULAR -- NEXT, PLEASE.
IN RESPONSE TO THE CONCERN ABOUT THE RECYCLING CONTAMINATION, THE SYSTEM ADDRESSED THIS CONCERN BY ALLOWING THE RECYCLABLES TO STAY FOR A LONGER PERIOD BEFORE -- INSTEAD OF DIVERTING THE RECYCLABLES TO OTHER DISPOSAL FACILITIES.
IN OTHER WORDS TWO SYSTEMS HAVE RESPONDED TO EVEN THE SAME CHALLENGE DIFFERENTLY.
NEXT, PLEASE.
SOME DIFFERENT SYSTEMS MAY FACE THEIR OWN UNIQUE CHALLENGES HAVE RESPOND DIFFERENTLY.
NEXT, PLEASE.
THEN HOW CAN WE DEVELOP A PLAN FOR FUTURE PANDEMIC EVENTS?
NEXT.
WE BELIEVE THAT OUR REPRESENTABLE PROJECT CAN DEVELOP AN INFORMATIONAL DATABASE WHERE A LOCAL WASTE MANAGEMENT SYSTEM CAN FIND AND ADAPT THE BEST MANAGEMENT PRACTICES BASED ON THEIR REGIONAL CONTEXT AND SYSTEM CHARACTERISTICS.
NEXT.
SIMILARLY, OTHER STREAM EVENTS SUCH AS NATURAL DIGESTERS CAUSED LOTS OF CHALLENGES TO LOCAL WASTE MANAGEMENT SYSTEMS AND WE BELIEVE THAT SUCH ACCUMULATIVE KNOWLEDGE HELPS US TO RESPOND TO SUCH DESTRUCTIVE EVENTS IN A MORE SUSTAINABLE AND EFFECTIVE WAY.
THANK YOU AND THIS IS THE END OF MY PRESENTATION.
>> THANK YOU, DR. CHOI FOR THAT GREAT PRESENTATION.
I WOULD NEXT LIKE TO INTRODUCE OUR THIRD SPEAK, DR. SHAKIRA HOBBS.
DR. SHAKIRA HOBBS IS AN ASSISTANT PROFESSOR IN THE DEPARTMENT OF CIVIL ENGINEERING AT THE UNIVERSITY OF KENTUCKY.
DR. SHAKIRA HOBBS SCHOLARSHIP EXPLORES MULTI-DISCIPLINARITY APPROACHES TO SUSTAINABLE ENGINEERING, INTERNATIONAL DEVELOPMENT AND LIFE CYCLE THINKING APPLIED TO FOOD, ENERGY-WATER NEXUS.
HER AREA OF RESEARCH FOCUSES ON DEVELOPING METHODS OF MANAGE ANTHROPOGENIC ACTIVITY SUCH AS CONVERTING WASTE TO ENERGY AND MODELLING TRANSPORT OF PESTICIDES.

IN 2018 SHE FOUNDED BIOGALS, A U.S. NONPROFIT ORGANIZATION THAT WORKS INTERNATIONALLY EMPOWERING WOMEN OF COLOR TO CREATE SUSTAINABLE SOLUTIONS.
I HIGHLY RECOMMEND IT.
DR. HOBBS RECEIVED SOME SEED FUNDING FOR WASTEWATER ASSESSMENT FOR CORONAVIRUS IN KENTUCKY.
PLEASE WELCOME DR. HOBBS.
>> FOOD AND WASTE WATER.
THE WORLD IS HEALING WE SAW ENVIRONMENTAL CONDITIONS IMPROVE AND MORE WILDLIFE ROAMING IN CITIES.
WATCHING IN HAPPEN DURING COVID-19 HIGHLIGHTED THE STARK REALITY AND THE POLLUTION AND WASTE ENVIRONMENT DUE TO HUMAN ACTIVITY.
TODAY I WANT TO TALK TO YOU ABOUT TWO FASCINATING WAYS WASTE CAN BE UTILIZED TO HELP ANSWER COVID-19 RELATED QUESTIONS AND FOOD WASTE AS AN ENERGY SOURCE.
NEXT SLIDE.
FRAGMENTS OF SARS COV-2 IN WASTE WATER CAN BE USED TO SURVEILLANCE OCCURRENCE IN COVID-19.
A GROUP AND I ELECTED CORONAVIRUS IN KENTUCKY VIA WASTE WATER.
THE FRAGMENTS WE ARE INTERESTED IN ARE RIBONUCLEIC ACID IN RNA.
IT'S IN ALL LIVING CELL ASKS IT'S ROLE IS TO ACT AS A MESSENGER.
NEXT, PLEASE.
CARRYING THAT INFORMATION ABOUT THE VIRUS WE CAN USE THAT IN SARS-COV-2 IN WASTE WATER.
NEXT SLIDE.
WE SELECTED SAMPLES.
THE WASTE WATER WAS CLEANED USING SARS-COV-2RNA.
PUT INTO SERUM BOTTLES.
THE RNA WAS TRACKED USING SAMPLES AND USING CHAIN REACTION.
NEXT SLIDE.
AGO DIFFERENT EXPERIMENTS WERE USED TO EVALUATE THE AGES OF SARS COV-2 UNDER VARIOUS CONDITIONS.
NEXT SLIDE.
THE COPP COPIES OF SARS COV-2 ARE STILL PRESENT FOR SAMPLES.
HOWEVER NO COPIES ARE PRESENT AFTER A WEEK.
THIS ASSISTS WITH THE UNDERSTANDING THE FACTOR THAT INFLUENCE THE DEGRADATION AND TIME PERIOD IN WHICH WASTE WATER SAMPLES NEED TO BE AN ANALYZED TO MAKE AN INFORMED DECISION.
FOR INSTANCE THE DEGRADATION OF SARS COV-2 RNA.
COVID-19 TAUGHT US ABOUT DISPARITIES AND HOW WE NEED EFFECTIVE SOLUTIONS TO HELP OUR MOST VULNERABLE COMMUNITY WE HAVE SEEN THIS TECHNOLOGY BE DEPLOYED AT COLLEGE DORM AND NURSING HOMES AND SHELTERS AND PRISONS.
ADDITIONAL COMMUNITIES THAT COULD BENEFIT FROM THERE ARE RURAL COMMUNITY ASKS LOWER INCOME COUNTRIES ARE SEPTIC TRAINS.
NEXT SLIDE, PLEASE.
SINCE I'VE BEEN WORKING WITH THE VILLAGE INBY LEADS I'VE BECOME AWARE OF HOW IMPORTANT IT IS TO INVOLVE COMMUNITIES IN A DECISION MAKING PROCESS.
I'VE BEEN WORKING WITH CITY RIVER VILLAGE IN BELIZE SINCE 2015 AND THE MAIN METHOD FOR MANAGING WASTE IS DUMPING TRASH IN THE RIVER.
THE COMMUNITY WANTED TO EXPLORE METHODS FOR MANAGING ITS WASTE.
NEXT SLIDE.
DESPITE THE GRAPH ON THE RIGHT IT SHOWS CURRENT WASTE MANAGEMENT TECHNIQUES.
THESE ARE HOW THINGS ARE CURRENTLY RAN.

AND COMMUNITY MEMBERS WANT TO GO FROM LARGER AREA TO SMALLER AREA.
NEXT.
THE INTRODUCTION OF BIO DIGESTERS OR ANAROBIC DIGESTION TO DIGEST THE AREA.
IT'S A RENEWABLE ENERGY TECHNOLOGY THAT CONVERTS FOOD WASTE TO ENERGY.
NEXT SLIDE.
WITH THE COMMUNITY WE IDENTIFY ANAROBIC DIGESTION AS A VIABLE METHOD FOR MANAGING FOOD WASTE AND USING VIABLE GAS TO COOK SCHOOL LUNCHES.
WE HAD SEVERAL INTERACTIONS WITH COMMUNITY MEMBERS DESIGNING THE PROTOTYPE ASK TESTING IT WITH THE COMMUNITY.
WE SPENT A LOT OF TIME AT THE SCHOOL ENGAGING WITH PRIMARY SCHOOL KIDS AND INTRODUCING THEM TO ANAROBIC DIGESTION.
WE BUILT A PILOT SCALE DIGESTER WITH A LOCAL CONSTRUCT COMPANY.
LASTLY WOMEN OF COLOR THAT JOINED ME ON THIS TRIP GAINED A SENSE OF BELONGING AND IDENTIFIES MORE WITH BEING AN ENGINEER.
THERE'S JUST A CLIP OF US LOADING THE DIGESTER.
NEXT SLIDE.
FROM SESSIONS THREE AND FOUR, WE -- I BRIEFLY DEMONSTRATED WAYS IN WHICH WE CAN AMPLIFY THE VALUE OF WASTE, RECOVER RESOURCES AND ENGAGED COMMUNITY AND TECHNOLOGY INTEGRATION.
DUE TO COVID-19, IT'S BEEN CHALLENGING COORDINATING INTERNATIONAL RESEARCH.
BUT THERE HAVE BEEN OPPORTUNITIES TO SUPPORT KNOWLEDGE EXCHANGE.
NEXT.
FINALLY, IT'S IMPORTANT TO CONCONTINUE THIS WORK BECAUSE OF THE IMPACT IT CONTINUES TO HAVE WITH WOMEN OF COLOR AND ENGINEERING.
HERE ARE SOME COLLEAGUES WHO CAME TO ME WITH BELIZE AND WORKED ON THIS WORK WITH ME.
CONTINUING IN ENGINEERING AS FACULTY MEMBERS AND POST DOCTORAL SCHOLARS AND PROJECT ENGINEERS AND ENVIRONMENTAL ENGINEERS FOR A GOVERNMENT AGENCY.
THANK YOU.
>> THANK YOU, DR. HOBBS FOR THAT GREAT PRESENTATION AND ALL OF YOUR RESEARCH AND WORK WITH THE COMMUNITY.
NEXT I WOULD LIKE TO INTRODUCE DR. COSTA SAMARAS.
DR. SAMARAS IS AN ASSOCIATE PROFESSOR IN THE DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING IN AFFILIATED FACULTY IN THE ENERGY SCIENCE, TECHNOLOGY AND POLICY PROGRAM AT CARNEGIE MELLON UNIVERSITY.
HIS RESEARCH SPANS ENERGY, CLIMATE CHANGE, AUTOMATION AND DEFENSE ANALYSIS.
DR. SAMARAS ANALYZES HOW ENERGY TECHNOLOGY AND INFRASTRUCTURE SYSTEM DESIGNS EFFECT ENERGY USE AND NATIONAL SECURITY, RESILIENCE
TO CLIMATE CHANGE IMPACTS, ECONOMIC AND EQUITY OUTCOMES AND LIFE CYCLE ENVIRONMENTAL EMISSIONS AND OTHER EXTERNALITIES.
DR. SAMARAS REGULARLY PROVIDED COMMENTARY TO ONLINE PRINT, RADIO AND TELEVISION MEDIA.
SO YOU MAY HAVE SEEN HIS ARTICLES IN THE "NEW YORK TIMES," "WASHINGTON POST," AND "THE WALL STREET JOURNAL," AND OTHER OUTLETS.
HE HAS APPOINTED HIS RESEARCH TO SENIOR APPOINTED GOVERNMENTAL LEADERS AS WELL.
PLEASE WELCOME DR. SAMARAS.
>> THANK YOU FOR THAT VERY KIND INTRODUCTION.
I WANT TO TALK ABOUT THE UNCERTAINTY OF COVID-19.
I WOULD LIKE TO THANK THE GREAT GRADUATE STUDENTS I'M WORKING WITH AND SPECIFICALLY MIKE GRIFFEN.

SINCE THIS IS ABOUT POLLUTION.
I WILL START WITH IT AS A BOOT SCRAPER WITH EACH HORSE PRODUCING 15 TO 30 TONS OF MANEUVER PER DAY MULTIPLIED BY HUNDREDS OF THOUSANDS.
THE BOOT SCRAPER ALLOWED YOU TO REMOVE 75%, 80% OF THE POLLUTION BEFORE YOU WENT INTO YOUR HOME, RIGHT.
BUT THE TRANSITION TO AUTOMOBILES, POWERED WITH GASOLINE SOLVED THIS PROBLEM.
BUT IT INTRODUCED A LOT OF NEW ONES.
NEXT SLIDE, PLEASE.
CIVIL AND ENVIRONMENTAL ENGINEERS, URBAN PLANNERS AND ARCHITECTS SHAPED THE FUTURE.
AND IN A LOT OF PLACES IN THE UNITED STATES, THIS SOUR CURRENT LEGACY.
NEIGHBORS AND LIVELIHOODS WERE BY SECONDED BY CONCRETE AND POLLUTION HAS DISPROPORTIONATELY AND CONTINUOUSLY AFFECTED COMMUNITIES OF COLOR.
THE NEXT TRANSPORTATION SYSTEM HAS TO BE DIFFERENT.
NEXT SLIDE.
WE HAVE A HUGE CHALLENGE IN DECARBONIZING TRANSPORTATION.
TRANSPORTATION IS NOW THE LARGEST SOURCE OF GREENHOUSE GAS EMISSIONS IN THE UNITED STATES.
AND WITHIN THE TRANSPORTATION SECTOR, EMISSIONS FROM CARS AND SUVS -- THAT'S THE BLUE AREA HERE, IS THE LARGEST SOURCE.
THE EMISSIONS FROM AVIATION IS THE RED AREA, AND THE EMISSIONS FROM FREIGHT TRUCKING, PRIMARILY FROM FRAYING TRUCKING IS THE YELLOW AREA HERE.
WHAT DOES THIS MEAN?
THE DOTTED LINE IS 80% OF REDUCED EMISSIONS.
THIS MEANS WE WILL HAVE TO REDUCE BELOW THAT LINE TO GET 80% IN REDUCED TRANSMISSIONS BUT THERE'S MORE.
WE DON'T NEED AN 10% REDUCTION.
WE NEED EMISSIONS TO GO TO 0.
WE HEARD FROM DR. IVEY THAT COVID-19 HAS REDUCED EMISSIONS.
EVEN UNDER THE PEAK OF COVID-19 TRANSMISSION USE WAS DOWN 30 TO 40%.
A PANDEMIC IS THE WORST POSSIBLE WAY TO REDUCE EMISSIONS AND YET EVEN UNDER A GLOBE LOCKDOWN WE STILL HAD ONLY AN EMISSIONS REDUCTION OF 30 TO 40%.
SO THE QUESTION IS NOW WHAT KINDED OF SYSTEM DO WE BOUNCE BACK TO?
AUTO SALES ARE DOWN.
SOME CITIES ARE INVESTING IN BICYCLE AND PEDESTRIAN INFRASTRUCTURE BUT THERE'S BEEN A SHIFT AWAY FROM PUBLIC TRANSIT.
THESE TREND CAN EFFECT THE WAY THAT THE FUTURE UNFOLDS.
NEXT SLIDE, PLEASE.
SO BLAH WE ARE WORKING ON IS MODELING THE BROAD RANGE OF PLAUSIBLE FUTURES TO UNDERSTAND AND IDENTIFY ROBUST POLICY AND INFRASTRUCTURE PATHWAYS FOR THE TRANSPORTATION DECARBONIZATION.
WHAT DOES THAT MEAN?
HOW THIS WORKS WHEN TRAVEL CHANGES AND WHEN TECHNOLOGY CHANGES, WHEN THE GRID CHANGES AND WHEN BEHAVIOR CHANGES, AND REALLY TRY TO UNDERSTAND WHAT ARE THE TARGETS WITHIN ALL OF THOSE THAT WE NEED TO HIT TO MAKE SURE WE ARE ON TRACK TO DECARBONIZING TRANSPORTATION.
ONE THING REALLY STANDS OUT.
HOW MUCH WE DRIVE.
THE NEXT TRANSPORTATION SYSTEM NEEDS TO FOCUS ON EQUITABLE ZERO CARBON MOBILITY AND ADJUST TRANSITION WHILE WINDING DOWN THE ERA OF OIL.
NEXT SLIDE, PLEASE.

THERE ARE A LOT OF NEW TECHNOLOGIES EMERGING IN TRANSPORTATION.
AND WE MODEL THE IMPACT OF A LOT OF THESE.
AUTOMATION IN SHIPPING AND AUTOMATION IN PASSENGER VEHICLES AND MICRO MOBILITY.
THESE TECHNOLOGIES COULD IMPROVE THE LIFE CYCLE ENVIRONMENTAL OUTCOMES.
THEY COULD IMPROVE EQUITY OUTCOMES.
OR THEY CAN MAKE ALL OF THESE A LOT WORSE.
WE DON'T HAVE TO WAIT AND REGRET THE NEXT TRANSPORTATION SYSTEM.
WE HAVE THE OPPORTUNITY TO SHAPE IT RIGHT NOW.
WE AS ENGINEERS HAVE AN ETHICAL RESPONSIBILITY TO DESIGN A SUSTAINABLE AND EQUITABLE FUTURE FOR EVERYONE SO THAT WE CAN LOOK BACK WITH PRIDE ON THIS NEXT PHASE OF A TRANSPORTATION SYSTEM.
THANK YOU SO MUCH AND I LOOK FORWARD TO THE DISCUSSION.
>> THANK YOU, DR. SAMARAS FOR YOUR WONDERFUL PRESENTATION AND A REMINDER OF OUR ETHICAL OBLIGATION AS ENGINEERS IN THE WORK AND RESEARCH YOU DO.
I WOULD LIKE TO INTRODUCE OUR LAST PANELIST, DR. JULIE ZIMMERMAN.
DR. ZIMMERMAN HOLDS JOINT APPOINTMENTS AS A PROFESSOR IN THE DEPARTMENT OF CHEMICAL AND ENVIRONMENTAL ENGINEERS AND SCHOOL OF FORESTRY ENVIRONMENTAL STUDIES AT YALE UNIVERSITY AND ALSO SERVES AS SENIOR ASSOCIATE DEAN FOR ACADEMIC AFFAIRS AND FES AND AS WELL AS THE DEPUTY DIRECTOR OF CENTER FOR GREEN CHEMISTRY AND GREEN ENGINEERING AT YALE.
HER PIONEERING WORK ESTABLISHED FUNDAMENTAL FRAMEWORK FOR HER FILED WITH HER SEMINAL PUBLICATIONS ON THE "TWELVE PRINCIPALS OF GREEN ENGINEERING" IN 2003.
AND PROFESSOR ZIMMERMAN IS CO-ARTHUR OF TEXT BOOK, "ENVIRONMENTAL ENGINEERING, FUNDAMENTALS AND SUSTAINABLITY, DESIGN."
IN ADDITION DR. ZIMMERMAN IS EDITOR-IN-CHIEF FOR THE ENVIRONMENTAL SCIENCE AND TECHNOLOGY.
AND PRIOR TO COMING TO YALE UNIVERSITY, DR. ZIMMERMAN WAS A PROGRAM MANAGER AT THE U.S. ENVIRONMENTAL PROTECTION AGENCY, WHERE SHE ESTABLISHED THE NATIONAL SUSTAINABLE DESIGN COMPETITION,
P3, PEOPLE PROSPERITY AND PLANET AWARD, WHICH HAS ENGAGED THOUSANDS OF STUDENTS FROM HUNDREDS OF UNIVERSITIES ACROSS THE U.S. SINCE ITS INCEPTION IN 2004.
PLEASE WELCOME DR. ZIMMERMAN.
>> THANK YOU.
I WILL TALK ABOUT WHAT A GREEN CHEMISTRY FUTURE MIGHT LOOK LIKE WITH A NEAT EXAMPLE THAT WE JUST LAUNCHED A NEW COMPANY.
SO NEXT SLIDE, PLEASE.
SO THE FIRST THING TO TALK ABOUT IS THE IMPACT OF THE HEALTH CARE SECTOR GLOBALLY.
IT'S ABOUT 4.6% OF THE TOTAL GREENHOUSE GAS EMISSIONS.
AND YOU WILL NOTE THE U.S. IS QUITE OUT OF SCOPE WITH OTHER COUNTRIES IN TERMS OF OUR EMISSIONS PER HEALTH CARE TREATMENT.
NEXT SLIDE, PLEASE.
SO INTERESTINGLY ENOUGH, IF HEALTH CARE WERE A COUNTRY IT WOULD RANK 13TH IN THE WORLD FOR GREENHOUSE GAS EMISSIONS SO THIS PRESENTS REALLY A BIG OPPORTUNITY, I WOULD SAY TO BRING ENGINEERING AND CHEMISTRY TO BEAR AND HOW WE PROVIDE HEALTH CARE AND CLOSES THE LOOP ON -- WE OFTEN THINK ABOUT CLIMATE AND IMPACTS ON HEALTH BUT THIS IS REALLY PROVIDING HEALTH CARE AND THE IMPACT ON CLIMATE CHANGE.

ALL OF THIS DATA I'M PRESENTING WAS BEFORE COVID.
NEXT SLIDE, PLEASE.
AND IF WE DIG INTO THIS DATA LITTLE BIT THERE'S LOTS OPPORTUNITIES FOR ENGINEERING AND PPE.
SO THINKING ABOUT HOW WE INTRODUCE THE IMPACT OF THE ENVIRONMENTAL SECTOR WE CAN THINK ABOUT THE CHEMICAL SECTOR AND EARLIER THIS YEAR SCIENCE MAGAZINE DID AN ISSUE IN THEIR SERIES ON TOMORROW'S EARTH RELATED TO HOW DO YOU DESIGN CHEMISTRY TO MATCH WHAT WE WANT FOR TOMORROW'S EARTH?
SO THERE WAS RULING PAPER OF THAT IS WHAT I'M GOING TO PRESENT NOW.
SO NEXT SLIDE.
SO IF WE THINK ABOUT THE EXISTING CHEMICAL SECTOR, IT LOOKS A LOT LIKE.
THIS WE HAVE HEARD ALREADY ABOUT LINEAR FLOWS, OF TAKING RESOURCES THAT TEND TO BE FOSSIL FUELS AND PUTTING THEM THROUGH A VERY LINEAR SYSTEM, GENERATING WAYS WITH THAT PRODUCTION AND POST CONSUMER USE.
WE CAN ALSO DIG IN AND LOOK AT THE KINDS OF CHEMISTRY WE ARE DOING AND THE KINDS OF CHEMICAL PROCESSES AND THE OFTEN THE RELIANCE ON ENGINEERS TO CLEAN UP THE LANDFILLS AND IMPACTS FROM INCINERATION AND EMISSIONS TO WATER AND AIR AS A RESULT OF THIS PROCESSION.
NEXT SLIDE.
THE OTHER THING WE NOTE OF COURSE IS THE WAY IT OPERATES.
SO TO THINK OF TOMORROW'S SECTOR TO NOT ONLY ADDRESS THE BROAD-SCALE ENVIRONMENTAL IMPACTS AND PUBLIC HEALTH CONCERNS BUT REALLY THE LOCAL ENVIRONMENTAL GIN JUSTICES.
NEXT SLIDE, PLEASE.
SO THE ARTICLE GOES INTO DETAILED DESCRIPTION OF WHAT TOMORROW'S CHEMICAL SECTOR COULD LOOK LIKE.
MOST IMMEDIATELY YOU WILL NOTE IT'S MOVING FROM A LINEAR PROCESS TO ONE THAT IS MORE CIRCULAR.
AND IN A THOUGHTFUL WAY -- AND I'M GOING TO TALK ABOUT THAT IN A MINUTE AS THIS PUSH TOWARDS A CIRCULAR ECONOMY HAS EMERGED IN OUR FIELD.
WHAT DOES THAT REALLY LOOK LIKE AS WE OPERATIONIZE IT.
AND IF YOU DIG INTO SOME OF THE UNLYING ATTRIBUTES THIS NEW CHEMICAL SECTOR IT TALKS ABOUT USING RENEWABLE FEED STOCKS AND THING THAT ARE NONTOXIC AND USING BIO MIMICRY TO HOW WE DO CHEMICAL TRANSFORMATIONS AND CHANGING THE DEFINITION OF WHAT FUNCTIONAL PERFORMANCE MEANS TO INCLUDE SUSTAINABILITY AS WELL.
SO NEXT SLIDE.
SO THIS IS OUR LATEST COMPANY THAT WE HAVE LAUNCHED OUT OF THE CHEMICAL OF ENGINEERING.
IT'S CALLED GREEN COMPANY.
SO THIS IS A CHEMICALLIST THAT WE HAVE PATENTED AND LICENSED TO THIS COMPANY.
THE STUDENT WHO WAS LEADING THIS RESEARCH IS ACTUALLY THE CTO ASSOCIATED WITH THE COMPANY.
AND IT TAKES CARBON DIOXIDE, REACTING IT IN SUN LIGHT WITH WATER OVER THIS CATALYST TO PRODUCE VODKA, ETHANOL.
ETHANOL AS COSTAS TALKED ABOUT OF COURSE IS ONE OF THE OPTIONS IN HOW WE MOVE TOWARDS RENEWABLE FUEL.
BUT THE ECONOMICS OF ETHANOL FOR FUEL ARE QUITE HARD TO OVERCOME.
BUT PEOPLE WILL PAY 70 OR $80 FOR A LITER OF VODKA.
SO THIS IS WHERE THE COMPANY STARTED.
SO THIS SHORT VIDEO WILL TELL YOU AS THE COMPANY EVOLVED.

SO FOR SIX MONTHS WE HAVE PRODUCED VODKA.
AND ACTUALLY DURING THAT TIME FROM MARCH THROUGH JULY THE COMPANY IS BASED IN THE NAVY YARD AND ACTUALLY PRODUCED TO PRODUCING HAND SANITIZER TO ADDRESS SOME OF THE SHORTAGES AROUND NEW YORK CITY FOR HEALTH CARE WORKERS.
THEY ARE BACK TO PRODUCING VODKA.
AND IF YOU REMEMBER THAT FENCE LINE COMMUNITY THAT I SHOWED YOU -- THIS IS ACTUALLY WHERE THE CHEMICAL PLANT IS LOCATED.
SO YOU WILL SEE IT'S A GREEN SPACE.
THERE'S LOTS OF PEOPLE AROUND THE COMMUNITY THAT SURROUNDS THIS LOOKS REALLY DIFFERENT.
AND IF WE THINK ABOUT SOLVING ENVIRONMENTAL INJUSTICES.
NOW WE ARE TALKING ABOUT LOCAL ECONOMIC DEVELOPMENT.
WE ARE ACTUALLY TALKING ABOUT INSTEAD OF PEOPLE FIGHTING NIMBY, NOT N MY BACKYARD.
IT CREATES TAX CUTS AND NOT HARMFUL FOR THE ENVIRONMENT.
AND THAT VIDEO THAT WENT BY WAS -- THE COMPANY JUST RECEIVED A RECENT CONTRACT FROM NASA TO TAKE CO-2 AND MAKE ROCKET FUEL AND OTHER MOLECULES THAT ARE RELEVANT IF WE THINK ABOUT LONG-TERM SPACE TRAVEL.
SO WE CAN MAKE PLASTICS AND BUILDING MATERIALS AND CHANGE THIS WORLD TOWARDS SOMETHING THAT IS MORE CARBON NEGATIVE USING GREEN CHEMISTRY AND GREEN ENGINEERING.
SO NEXT SLIDE.
SO LET ME TALK TO YOU A LITTLE BIT ABOUT THE FLOW HERE, WHEN WE THINK ABOUT DESIGNING A GREEN CHEMISTRY FUTURE.
SO THE FIRST ONE IS FUNCTION.
IT HAS TO BE AT THE HEART AND CENTER OF WHAT HE WE DO.
WHAT WE DO -- WHETHER IT'SED A LEASIVE OR A PAINT, OR WATER TECHNOLOGY, WE ARE NOT GOING TO SUCCEED NO MATTER HOW SUSTAINABLE IT IS.
THE NEXT QUESTION I WOULD ASK IS, IS IT MADE FROM DEPLETION RESOURCES SO IF ARE ARE RELYING ON FOSSIL FUEL WES CAN'T GET SUSTAINABILITY ON THIS.
WE NEED TO MOVE TO SUSTAINABLE FEED STOCKS.
THIS MEANS BIO FEED STOCKS AND WASTE FEED STOCKS LIKE CARBON DIOXIDE AND SELLOS AND OTHER VASTLY BIDELY AVAILABLE WASTE MATERIALS FROM INDUSTRIAL PROCESSING.
NEXT IS TO THEN TALK ABOUT THE TOXICITY.
WHAT IS THE INHERENT NATURE OF THE CHEMICALS AND MATERIALS WE ARE MAKING AS WELL AS THE TRANSFORMATION OR PROCESSING WE ARE USING TO CREATE THOSE PRODUCTS AND MATERIALS.
HOW DO WE MOVE TOWARDS THINGS THAT ARE MORE BENIGN AND INHERENTLY SAFE SORRY WE ARE LESS CONCERNED ABOUT CONTROLLING THE CIRCUMSTANCES IN WHICH THESE THINGS ARE UTILIZED?
AGAIN THIS BENEFITS A PUBLIC HEALTH PERSPECTIVE AND ADDRESSES ENVIRONMENTAL UNJUSTICE.
AND THEN FINALLY THE NEXT THING TO THINK ABOUT IS THIS IDEA AND THIS GIANT PUSH TOWARD A CIRCULAR ECONOMY.
BUT AS YOU REALLY START TO DIG INTO THIS AND START THINKING ABOUT IT, THERE ARE LOTS OF THINGS WE MAKE AND WE KNOW AS ENVIRONMENTAL ENGINEERS THAT WIND UP IN WASTE WATER TREATMENT PLANS THAT ARE NEVER GOING TO COME BACK INTO A CIRCULAR ECONOMY.
WHETHER IT'S SHAMPOOS, PESTICIDES --
THESE THINGS ARE DISTRIBUTED IN THE ENVIRONMENT AND ARE INTENDED TO BE SO.

SO WE ACTUALLY WANT TO THINK WHETHER THESE THINGS SHOULD BE MADE TO BE DEGRADABLE VERSUS THOSE THINGS THAT WE WANT TO DESIGN TO BE PERSISTENT BECAUSE THEY HAVE HIGH COMPLEXITY OR BECAUSE THEY HAVE HIGHLY VETTED ENERGY.
AND THEREFORE IT MAKES SENSE TO TRY TO CLOSE THE LOOP ON THOSE MATERIALS VERSUS THING THAT WE SHOULD NOT BE CHASING TO BRING INTO A CIRCULAR ECONOMY.
SO NEXT SLIDE.
AND IT'S MY LAST SLIDE.
IS THE DIFFERENCE BETWEEN THE COMPASS AND SPEEDOMETER.
I KNOW I'VE LAID OUT BIG GOALS AND BIG OPPORTUNITIES FOR THIS COMMUNITY.
BUT I WOULD REMIND ALL OF US TO ORIENT TO TURN NORTH AND THAT WE AGREE ON A PATH OF WHERE WE WANT TO GO AND WHAT THE DESTINATION IS AND WORRY LESS ABOUT HOW FAST WE CAN GET THERE.
WITH THAT I'M HAPPY TO PARTICIPATE IN THE DISCUSSION AND TAKE ANY QUESTIONS.
AND AGAIN I APPRECIATE THE OPPORTUNITY TO BE HERE.
>> THANK YOU, DR. ZIMMERMAN, FOR THAT PRESENTATION AND ALL OF YOUR GREAT WORK.
IT'S REALLY EXCITING ABOUT THE COMPANY MAKING VODKA.
BUT ALSO ALL OF YOUR WORK IN GREEN CHEMISTRY.
AND EVERYONE, ALL OF THE PANELISTS WORK IN GENERAL TRYING TO ADDRESS POLLUTION PREVENTION BEFORE TREATMENT.
AND WHERE THINGS LIKE GREEN CHEMISTRY AND OTHERS.
SO I DO INVITE ALL THE PANELISTS TO TURN ON THEIR VIDEOS AND ALL THE ATTENDEES PLEASE SUBMIT ECONOMIZE AND QUESTIONS AND ANSWERS ON THE RIGHT BOTTOM OF YOUR PANEL IF YOU HAVE NOT ALREADY.
WE HAVE SOME STANDARD QUESTIONS WE ASK EACH SIGNIFICANT THAT WE WILL START WITH.
AND THEN WE WILL GET TO THE OTHER SUBMITTED QUESTIONS.
I THINK WE HAVE EVERYONE.
SO THE FIRST QUESTION IS WHAT ROLE DOES EQUITY PLAY IN YOUR RESEARCH IN TEACHING?
AND HOW DO YOU INN SCORE RATE EQUITY IN YOUR RESEARCH AND TEACHING?
SO THIS CONFERENCE IS AEESP CONVERGING ENVIRONMENTAL HEALTH AND EQUITY.
EQUITY IS A BIG PART OF THIS CONFERENCE.
SO THAT'S WHY WE ASK THIS QUESTION.
I GUESS WE CAN GO IN ORDER FROM THE SPEAKERS, IF YOU WANT TO TOUCH ON IT.
DR. IVEY.
WOULD YOU LIKE TO TALK ABOUT HOW YOU INCORPORATE EQUITY IN YOUR RESEARCH AND TEACHING?
>> ABSOLUTELY.
THANK YOU FOR THE QUESTION.
I WILL START WITH RESEARCH.
SO I AM TRADITIONALLY TRAINED IN AIR QUALITY MODELLING, WHICH IS A VERY TECHNICALLY DRIVEN FIELD.
SO WHEN I BECAME A PROFESSOR, I REALIZED THAT I NEEDED TO ACTUALLY PAINT AN UMBRELLA OF EQUITY OVER ALL OF THE RESEARCH THAT I DO.
SO WHAT THAT MEANS IS APPLYING THE TOOLS THAT I HAVE STRENGTHS IN TO DIRECTLY ANSWER QUESTIONS RELATED TO INEQUITIES AND AIR POLLUTION EXPOSURE.
SO IN TERMS OF RESEARCH, AND WRITING PROPOSALS THE BROADER IMPACT STATEMENTS PRETTY MUCH WRITE THEMSELVES.
AS FAR AS AIR POLLUTION IS CONCERNED.

AND I ALWAYS TRY TO MAKE SURE TO DIRECTLY ADDRESS INEQUITIES IN MY WORK.
AND WITH TEACHING I ACTUALLY TEACH THERMAL DYNAMICS AND CHEMICAL PROCESS ANALYSIS.
I TEACH TECHNOLOGY AND AIR POLLUTION CONTROL.
AND THERE IS AN OPPORTUNITY TO TALK ABOUT ENVIRONMENTAL AND SUSTAINABILITY ISSUES AND EQUITY ISSUES IN EACH OF THESE CLASSES.
BECAUSE THE ENDPOINT OF A LOT OF THESE INDUSTRIES IS HARMFUL EXPOSURES.
SO THE STUDENTS ACTUALLY, THEY ENJOY SEEING THE APPROACH OR EXPLANATION OF HOW VARIOUS SORES IMPACT AIR POLLUTION AND HEALTH.
>> THANK YOU.
DR. CHOI.
DO YOU HAVE ANY COMMENTS ON EQUITY AND RESEARCH AND TEACHING?
>> YES.
ACTUALLY AS SOME OF YOU MAY ALREADY KNOW, I'M A FACULTY MEMBER OF TWO INDEPENDENT UNIVERSITIES.
ONE IS FLORIDA STATE UNIVERSITY.
AND THE OTHER ONE IS FLORIDA AM UNIVERSITY.
AND ACTUALLY TECHNICALLY I CAN ALSO ADVISE BOTH UNIVERSITIES AND ACTUALLY IT'S ONE OF THE ECUS.
SO GENERALLY THE WAY I CONTRIBUTE TO THE INSTITUTIONAL DIVERSITY AND INCLUSION IS, GENERALLY I TRY TO GIVE MORE OPPORTUNITY TO THIS AFRICAN-AMERICAN STUDENT AND ALSO LET THEM KNOW ABOUT ANY TUNE.
BECAUSE BASED ON MY EXPERIENCE, WHAT IS HAPPENING IS THAT ALTHOUGH THIS AFRICAN-AMERICAN STUDENTS -- THEY ARE -- THEY REALLY WANT TO PARTICIPATE IN ANY RESEARCH AND TEACHING ACTIVITIES.
HOWEVER SOMETIMES THEY MAY NOT KNOW ABOUT THIS OPPORTUNITY BECAUSE OF LIMITED ACCESS TO THE INFORMATION.
AND ALSO THEY BELIEVE THAT THEY MAY NOT BE ELIGIBLE.
ALTHOUGH THAT IS NOT THE CASE.
SO GENERALLY -- WHAT I GENERALLY DO, I GENERALLY TAKE EXTRA CARE ABOUT HOW I CAN DISSEMINATE ANY OPPORTUNITY WITHIN MY GROUP, WITHIN MY DEPARTMENT TO THIS UNDERREPRESENTATIVE STUDENT AND ALSO TRY TO KEEP THEM IN THE LOOP FOR ANY OPPORTUNITIES.
SO THAT IS KIND OF WHAT I GENERALLY DO WITHIN MY DEPARTMENT.
>> THANK YOU.
DR. HOBBS, ANYTHING TO ADD?
I KNOW YOU TOUCHED ON IT IN YOUR PRESENTATION FOR THE WORK YOU DO IN THE COMMUNITY AND MAKING SURE WOMEN OF COLOR PURSUE ENGINEERING.
>> YES.
SO I WILL ADD THAT ENGINEERING IS BECOMING BETTER AT INTEGRATING EQUITY INTO THE CURRICULUM AND THE RESEARCH.
IT IS STILL POSSIBLE FOR FUNDAMENTAL RESEARCH TO STILL HAPPEN AND COMBINE THAT WITH TECHNOLOGY PROGRESSION AND TECHNOLOGY FIND GRADUATION.
BUT IN ORDER FOR ENGINEERING TO REALLY SOLVE THESE REAL WORLD PROBLEM, YOU NEED TO WORK WITH THE COMMUNITY.
AND WE NEED TO LOOK AT WHO HAS ACCESS TO WHAT, WHO RECEIVES A BURDEN, WHO DOESN'T RECEIVE THE BURDEN.
AND THAT'S THE RESPONSIBLE OF AN ENGINEER TO BE ABLE TO DO THAT.
SO THAT'S WHAT I DO.
MANY MY LAB I APPROACH THAT FROM A SYSTEMS APPROACH.
LOOKING AT FOOD, ENERGY, WATER SYSTEMS.

LOOKING AT HOW THEY CONNECT.
AND THEN I LIKE GOING INTO THE COMMUNITIES AND SOLICITING FEEDBACK, GETTING -- UNDERSTANDING THEIR WILLINGNESS TO ADOPT THE TECHNOLOGY.
IS IT SOMETHING THAT'S SO FAR-FETCHED THAT IT'S JUST NOT SOMETHING THAT IS REASONABLE FOR THE COMMUNITY.
IF SO IT'S SOMETHING THAT ENGINEERING NEED TO ADDRESS.
SO THAT'S WHAT WE LOOKING FOR A LOT IN MY LAB.
IN TERMS OF TEACHING I TEACH A COURSE INTRODUCTION TO HUMANITARIAN ENGINEERING.
SOME OF THE STUDENTS ARE ACTUALLY ONLINE NOW.
SO WE FOCUSED ON THE FIRST HALF OF THE SEMESTER IS DECENTERING THE TECHNOLOGY.
REALLY UNDERSTANDING COMMUNITY NEEDS.
AND THEN THE LAST PART OF THAT CLASS WE ARE ACTUALLY DESIGNING WITHIN CONSTRAINTS SO HOW DO YOU ENGINEER WITHOUT THE CONSTRAINTS.
AND LASTLY, I'M REALLY INTENTIONAL ABOUT RECRUITMENT AND OF STUDENTS OF COLOR IN MY LAP.
THERE'S JUST CERTAIN ADVOCATES THAT ARE NECESSARY THAT ARE NECESSARY TO RETAIN STUDENT OF COLOR IN ENGINEERING.
>> THANK YOU, DR. HOBBS.
AND I THINK WE CAN LEARN A LOT FROM YOU AND YOUR AUTHORIZED.
DEFINITELY IMPORTANT TO NOT DESIGN TECHNOLOGIES IN A VACUUM WITHOUT INPUT FROM THE COMMUNITY.
SO THANK YOU.
DR. SAMARAS.
>> THANKS.
EQUITY AND JUSTICE ARE WEAVED THROUGH A LOT OF THE RESEARCH QUESTIONS THAT WE HAVE IN OUR GROUP.
HOW DOES AUTOMATION EFFECT VULNERABLE COMMUNITIES AND HOW DOES NEW ENERGY OR OTHER TECHNOLOGY EFFECT COMMUNITIES THAT HAVE HISTORICALLY BEEN MARGINALIZED.
SO A LOT OF OUR RESEARCH QUESTIONS HAVE EQUITY AND JUSTICE THREATS THAT ONE THROUGH THEY.
I'M ALSO VERY INTENTIONAL ABOUT BUILDING SUPPORTIVE AND DIVERSE GROUP AND BUILDING SUPPORTIVE AND DIVERSE COMMUNITY CULTURE INSIDE OF OUR UNIVERSITY.
FINALLY IN TEACHING, I TEACH OUR FIRST YEAR ENGINEERS.
AND ON THE FIRST DAY, THE FIRST THING WE TALK ABOUT IS THE ENGINEERS RESPONSIBILITY TO EQUITY AND JUSTICE AND THE WAY THAT CIVIL ENVIRONMENTAL ENGINEERS AS I MENTIONED IN MY TALK CAN HAVE A BIG IMPACT POSITIVE OR NEGLECT.
SO THESE ARE ENGINEERS THAT MAY NOT END UP BEING CEES THEY MAY BE ELECTRICAL OR COMPUTER OR MECHANICAL ENGINEERS AND ANY REALLY HAVE TO UNDERSTAND THE ENGINEER'S ETHICAL RESPONSIBILITY.
IT'S NOT SOMETHING EXTRA.
IT'S IN THE CODES OF ETHICS.
IF YOU DON'T DO THIS IT'S BAD.
IT'S NOT IF YOU DO IT IT'S GOOD.
SO I THINK THAT WE AS EDUCATORS CAN EASILY MAKE THIS IS A STANDARD PART OF OUR CURRICULUM BECAUSE WE HAVE TO, AND BECAUSE WE SHOULD.
>> THANK YOU.
IT SEEMS ALSO THAT THE DOCTORS HAVE ADDED RACIAL JUSTICE OR INEQUITIES TO THE HIPPOCRATIC OATH OR SOME OF THEM AT LEAST.
SO THAT'S VERY IMPORTANT AND ETHICS OF ALL PROFESSIONS.

DR. ZIMMERMAN?
>> GREAT.
I THINK THERE'S A COUPLE POINTS I WANT TO MAKE ON THIS.
ONE IS WE HAVE DONE RESEARCH TO LOOK AT ISSUES OF ENVIRONMENT AND SUSTAINABLE.
AND WHEN YOU JUST BRING THOSE TOPICS INTO THE CORE CURRICULUM AS WE HAVE HEARD ABOUT.
YOU SEE AN INCREASED RECRUITMENT OF INTENTION OF TECHNOLOGIES IN ENGINEERING AND SCIENCE DISCIPLINES.
SO OUR VERY TOPIC IN MAKING SURE WE ARE ROBUSTLY REPRESENTED IN ENGINEERING AT LARGE AND IN SCIENCE HAS AN IMPACT.
I WILL SAY THE SECOND THING IS -- YOU KNOW WE WERE TALKING A LOT ABOUT SCIENCE AND TECHNOLOGY.
I ALSO THINK ABOUT THE POLICY SIDE AND THERE HAS TO BE SOMETHING WRONG IN THE WAY HISTORICALLY WE HAVE DONE RICK ASSESSMENT.
OUR THOUGHT ABOUT ENVIRONMENTAL REGULATIONS THAT HAVE LED TO THE ENVIRONMENTAL INJUSTICES THAT WE SEE.
SO AS MUCH AS WE ARE WORKING ON SCIENCE AND TECHNOLOGY I WOULD ALSO THINK HA WE ALL NEED TO ENGAGE ON THE POLICY SIDE ABOUT WHAT THE FAILURES HAVE BEEN AND WHAT EPA OVER THE NEXT 50 YEARS TO BE YOU HAD DOING DIFFERENTLY TO ADDRESS THAT FUNDAMENTALLY.
AND THEN I THINK EVERYBODY GAVE GREAT EXAMPLES OF OUR GROUPS AND WHAT HE WITH DO.
I WILL SPEAK FROM THE PERSPECTIVE OF ENVIRONMENTAL SCIENCE.
ONE WE STOOD UP IN FRONT OF AN ADVISORY BOARD TO TRY TO BRING A DIFFERENT GENERATION AND A DIFFERENT COHORT OF PEOPLE INTO ESNT TO MAKE SURE WE ARE WELL POSITIONED FOR THE FUTURE OF WHAT OUR FIELD WILL LOOK LIKE.
AND I HAVE ALSO -- AND WORKED WITH AN EDITORIAL TEAM TO WORK WITH FIRST-TIME ARTHURS WHO ARE SUBMITTING TO THE JOURNAL TO TRY TO BROADEN WHO THAT COMMUNITY IS AND WHO IS PARTICIPATING AND PUBLISHING IN THE JOURNAL FOR OUR FIELD.
>> GREAT.
THANK YOU THOSE POINTS.
I THINK THERE WAS A RECENT PUBLICATION ABOUT PUBLISHING -- OR WHAT YOU SHOULD KNOW.
SO THAT WAS VERY USEFUL FOR ENVIRONMENTAL SCIENCE AND TECHNOLOGY.
ONE OF THE TOP JOURNALISTS IN OUR FIELD OR THE TOP JOURNAL.
SO THE NEXT QUESTION WAS REELED TO THE THEME OF CONVERGENCE.
AND AFTER HEARING OTHERS ON THIS PANEL AND IN GENERAL ON CONVERGENCE, HOW CAN WE MAKE OUR RESEARCH MORE CONVERGENT?
SO AT THE RISK OF HAVING AWKWARD ZOOM LICENSE I WILL LET ANYONE VOLUNTEER TO ANSWER THAT QUESTION.
DOES ANYONE WANT TO TALK ABOUT CONVERGENCE.
WE HAVE HAD PEOPLE SPEAK ON WASTE WATER AND AIR AND GREEN CHEMISTRY AND ALL DIFFERENT FIELDS.
>> I WILL SAY YOU THE AWKWARD ZOOM SILENCE.
I THINK YOU HIT ON IT EARLIER COLLEEN I THIS CONVERGENCE IS THE IDEA OF MOVING UPSTREAM.
HOW WE DO DESIGN.
WHETHER IT'S TRANSPORTATION SYSTEMS OR CHEMICALS OR COMMUNITIES OR TECHNOLOGIES FOR THOSE COMMUNITIES AND BY BRINGING ALL OF THESE IDEAS INTO THE

DESIGN PHASE IS DOES RESULT IN SYNERGISTIC BENEFITS ACROSS THE OUTCOMES WE LOOKING FOR.
SO THE CONVERGENCE CAN REALLY HAPPEN EARLY ON IN THE DESIGN PHASE TO ADDRESS MANY OF THE ISSUES THAT WERE RAISED.
>> THANK YOU.
ANY OTHER COMMENTS?
IF ANYONE THINKS OF ANYTHING THEY CAN COME BACK TO THAT.
DR. SAMARAS?
>> I THINK ONE NEW THING THAT HAS BEEN EMERGING THAT COVID HAS ILLUMINATED IS THE OVERLAP BETWEEN ENGINEERING AND ENVIRONMENTAL ENGINEERING AND PUBLIC HEALTH AT A BROADER PERCEPTION FROM SOCIETY.
AND I THINK WE AS ENGINEERS COULD DO A BETTER JOB REACHING OUT AND HAVING THOSE COMMUNITIES WORK ON OUR RESEARCH PROJECTS AND MAKING SURE THAT WE CAN MAKE A BIGGER CONTRIBUTION TO THAT SPACE.
>> A REALLY IMPORTANT POINT.
>> I CAN ALSO ADD -- ESPECIALLY -- SO TWO OTHER PEOPLE FROM THE UNIVERSITY AND I, WE RECENTLY RECEIVED THE FUNDING FROM THE NSF TO ESTABLISH EXTREME EVENT RECOGNIZANCE WITH A FOCUS ON SUSTAINABLE DISASTER DEBRIS MANAGEMENT PROBLEM.
AND ACTUALLY -- SO RIGHT NOW THE MANAGEMENT GROUP THAT WE ARE ALL ENGINEERING.
HOWEVER WE ALSO TRY TO REACH OUT TO THE INTERDISCIPLINARY SCHOLARS WHO ARE INTERESTED IN THIS MANAGEMENT PROBLEMS BECAUSE WE LOOKING AT THESE PROBLEMS AS INTERDISCIPLINARY PROBLEMS AND WITHOUT THEIR HELP WE BELIEVE THAT WE CANNOT EFFECTIVELY ADDRESS THE MAJOR CHALLENGES.
>> GREAT POINT ABOUT ENGAGING ALL OF THE DIFFERENT FIELDS.
PUBLIC HEALTH AND OTHERS.
DR. HOBBS.
>> SO I WAS JUST GOING TO ADD WHAT DR. SAMARAS SAID.
COVID HAS REALLY HELPED WITH CONVERGENCE RESEARCH.
A MEDICAL DOCTOR OF CHEMICAL ENGINEER AND ME AN ENVIRONMENTAL ENGINEER AND IT'S SOLELY BASED THAT WE ALL HAD RESOURCES AND INSTRUMENTS AND KNOWLEDGE THAT COULD BE USED TO ADDRESS SOMETHING THAT IS HAPPENING RIGHT NOW.
SO THERE ARE BLESSINGS IN DISGUISE THAT ARE COMING OUT OF COVID AND WE ARE LEARNING A LOT FROM THIS.
>> GREAT POINT.
DR. IVEY.
>> YES, I JUST WANTED TO MAKE A SUGGESTION AS FAR AS CONVERGENT RESEARCH IS CONCERNED, IS THAT PEOPLE THAT WORK IN THE SAME MEDIA IN SOME WAY -- WHETHER YOU WORK ON AIR OR WHETHER YOU ARE WORKING ON THE EMISSIONS, THE TRANSPORT, THE EXPOSURE OR THE DIRECT AIR CAPTURE.
THESE ELEMENTS THEY SPAN A LOT OF DIFFERENT DISCIPLINES, CHEMICAL ENGINEERING AND PUBLIC HEALTH PEOPLE.
IF YOU ARE WORKING IN THE SAME MEDIA I THINK WE SHOULD ENCOURAGE EACH OTHER TO TALK TO ONE ANOTHER A LOT MORE OFTEN, ESPECIALLY IF ANY PART OF YOUR RESEARCH IS RELATED TO THAT MEDIA.
SO THAT'S MY RECOMMENDATION.
>> DEFINITELY WE NEED TO HAVE MORE INTERACTIONS I KNOW WE ARE ALL VERY BUSY. BUT DEFINITELY IMPORTANT TO REACH CONVERGENCE.
SO NOW I WILL TURN TO SOME PRESUBMITTED AND SUBMITTED QUESTIONS.
DR. TROTZ YOU CAN ASK THE FIRST ONE?

>> SURE.
THIS ONE IS ACTUALLY DIRECTED TOWARDS JULIE.
AND IT SAYS REFERENCING THE VODKA PLANT IN BROOK LAND NAVY YARD, REDEVELOPMENT OF THAT AREA ONLY TOOK PLACE AT LEAST A DECADE AFTER GENTRIFICATION.
WHAT STEPS WOULD COMMUNITIES OF COLOR NEED TO DO IN ORDER TO CREATE THESE GREEN SPACE WITHOUT DRIVING OUT THE EXISTING POPULATION?
>> THAT'S A GREAT QUESTION.
SO I THINK IT'S IMPORTANT TO REMEMBER THAT THERE'S LOTS OF OPPORTUNITY IN BOUND FIELDS REDEVELOPMENT AND THIS IDEA OF BRINGING IN CHEMICAL OR MATERIAL OR PROCESSING PLANTS THAT ARE BASED ON GREEN CHEMISTRY AND GREEN ENGINEERING AND FOLLOWING THAT DESIGN FLOW CHART I TALKED ABOUT CHANGES.
WHERE THOSE CHEMICAL PLANTS CAN GO AND WHY A COMMUNITY WOULD WANT OR NOT WANT A FACILITY LIKE THAT AROUND.
SO THIS IS ABOUT CHANGING THE NATURE ABOUT THE CHEMICAL MANUFACTURING THAT WE DO.
AND I THINK IF WE DO THIS WHILE HAVING THESE KINDS OF PLANTS LOCATED IN BROWN FIELDS CREATES OPPORTUNITY TO HELP REVITALIZE NEIGHBORS, AGAIN BRINGING IT IN ON A TAX BASE AND JOBS TO A PLACE WHERE HISTORIC DAMAGE HAS BEEN DONE BY THE VERY SAME SECTOR.
>> THANK YOU.
>> THANK YOU.
SO ANOTHER QUESTION?
>> THERE ARE QUITE A FEW.
SO THIS IS FOR THE ENTIRE GROUP.
HAVE THERE BEEN ANY EFFORTS THAT YOU ARE AWARE OF TO STANDARDIZE EQUITY WITHIN SCORES, TEXTBOOKS AND RESEARCH DESIGN?
SUCH AS ADVOCATING THAT RACE OR ETHNICITY BE A PART OF THE RESULTS AND STUDIES AND NOT JUST A DISCUSSION POINT?
ANY VOLUNTEERS?
>> I KNOW SOME STUDENT ARE WANTING ENGINEERING CLASSES SO THIS IS A STUDENT-LED MOVEMENT FROM WHAT I'VE SEEN.
>> AND I THINK WHAT COLLEEN WAS ELUDING TO IS IN THIS TEXTBOOK THAT JIM HELSICK AND I WROTE ABELONG WITH LOTS OF OTHER CO-ARTHURS ON FUNDAMENTALS OF ENVIRONMENTAL ENGINEERING, THERE IS -- THROUGHOUT THE BOOK WOVE ANSWER THEME OF EQUITY WE PRESENT THE EARLY DATA SHOWING TOXIC RELEASE INVENTORY RELATED WITH SOCIOECONOMIC STATUS.
AND YOU CAN VICIOUSLY QUICKLY SEE.
SO ASKING STUDENTS TO THINK ABOUT WHERE LANDFILLS ARE CREATED AND THERE'S HALLMARK EXERCISES AND EXAMPLES THROUGHOUT THE BOOK THAT KIND OF REINFORCE THAT THEME.
I DON'T KNOW IF THAT'S A STANDARD.
BUT IF IT GETS TO HAVE THAT IN THE CURRICULUM IN THE TEXT BOOK THAT IS BEING USED TO TEACH ALL OF THE TRADITIONAL AND CONVENTIONAL FUNDAMENTALS OF ENVIRONMENTAL ENGINEERING.
>> ANY OTHER PANELISTS?
HAVE YOU SEEN MORE STANDARDIZATION OF EQUITY?
I KNOW AFTER THIS SUMMER IT SEEMS THERE'S BEEN A LARGER PUSH.
AND THERE'S STILL A LONG WAY TO GO.
AND AS DR. IVEY SAID, THE STUDENTS ARE DEMANDING IT AS WELL.
SO HOPEFULLY WE WILL SEE MORE STANDARDIZATION.

DR. SAMARAS?
>> I KNOW WE AT CARNEGIE MELLON ARE MAKING EFFORTS TO STANDARDIZE IT WITHIN OUR OWN CURRICULUM THAT MANY FACULTY HAD BEEN DOING IT, AND ALREADY H BEEN DOING IT FOR A LONG TIME.
I THINK IT WOULD BE NICE IF IT CAPE FROM AEESP OR EBID.
AND UNTIL WE GET TO THAT POINT I THINK WE CAN HAVE A BOTTOM-UP DRIVEN PROCESS WHERE WE ARE SHARING BEST PRACTICES AND INCORPORATING THIS AS A STANDARD PART OF OUR CURRICULUM.
>> THANK YOU.
I'VE SEEN A LOT MORE STUDIES FOCUSING ON EQUITY BUT IT SEEMS MORE THE SURFACE.
THIS IS INEQUITABLE BUT HOW WE DESIGN THE RESEARCH WILL BE IMPORTANT.
DR. TROTZ ANOTHER QUESTION?
>> SURE.
THIS IS HOPE HOCKMAN.
AND SHE SAYS SHE IS CONCERNED BY THE WASTE GENERATED BY SINGLE USE PPE.
THE MASK AND FACE SHIELDS THAT CONTAIN PLASTICS ESPECIALLY SINCE THEIR USE IS NORMALIZED.
SO WHAT CAN BE DONE TO GET AHEAD OF THIS BEFORE THIS DEBRIS MAKES ITS WAY TOWARDS RIVERS AND OCEANS?
>> ACTUALLY WE ALSO HEARD A LOT ABOUT THESE CONCERNS FROM THE MULTIPLE WASTE MANAGEMENT SECTORS.
ACTUALLY THE -- GENERALLY I CAN SEE THE TWO GENERAL APPROACHES TO THE THIS KIND OF PLASTIC CONTAMINATION ISSUE.
I THINK I MENTIONED THESE TWO APPROACHES DURING MY PRESENTATION.
GENERALLY IN THE CASE WHERE THEY HAVE THE FACILITIES -- INCINERATION FACILITIES, IT DOESN'T SOUND VERY ENVIRONMENTALLY FRIENDLY.
HOWEVER BECAUSE OF THESE WASTE CONTAMINATION ISSUES THEY GENERALLY SEND OF THESE PLASTICS TO THE INCINERATION FACILITIES.
AND THEN SECOND THAT WE CAN SEE FROM CALIFORNIA, THEY GENERALLY JUST LET THEM JUST STAY FOR A LONGER PERIOD OF TIME GENERALLY.
THEY LET THEM STAY FOR AT LEAST THREE DAYS BEFORE THEY START SORTING THESE RECYCLABLES FROM THE MIX OF THE OTHER WASTE.
BECAUSE AS YOU MAY KNOW, RECYCLING FACILITIES, MOST OF THE MATERIAL FACILITIES THEY STILL RELY ON THE PEOPLE SEGREGATING AND SEPARATING THE RECYCLABLES.
ACTUALLY WE DIDN'T HEAR MUCH ABOUT THE POSSIBLE -- ANY POSSIBILITY OF THIS PLASTIC WASTE GOING TO THE RIVERS OR ANY WATER STREAM.
BECAUSE WE GENERALLY TALK ABOUT -- WE GENERALLY TALK ABOUT ISSUES IN TWEAKING AND PROCESSING AND DISPOSING OF THE DAILY WASTE.
>> SORRY, COLLEEN.
>> IT'S OKAY.
IF DR. ZIMMERMAN TOUCHED ABOUT HEALTH CARE IN THE WORLD OF GREENHOUSE TRANSMISSIONS IF SHE HAD ANY COMMENTS ABOUT THE PPE WASTE.
>> SURE.
I THINK THIS IS AS PPE WASTE OR ANY OTHER PLASTICS WE TALK ABOUT, IT'S THE NATURE OF THESE MATERIALS.
AND WE GET INTO THIS CONVERSATION OF PLASTICS ARE BAD BUT IT'S BAD PLASTICS ARE BAD AND THERE'S SOME POLYMERS THAT WE SOMEHOW DEFINE AS BEING OKAY AND NATURAL POLYMERS AND AGAIN THIS IS REALLY CHANGING THE NATURE OF THE KIND OF CHEMICALS WE USE.

THINKING ABOUT OBEDIENT MATERIALS, THE MATERIAL THAT IS STABLE WHEN YOU WANT IT TO BE AND THEN IT'S TRIGGERED BY SOMETHING IN A FORMAL WASTE MANAGEMENT SYSTEM OR AN INFORMAL WASTE MANAGEMENT.
AND THEN YOU KNOW DEGRADE AND NOT DEGRADE INTO SOMETHING LIKE MICRO PLASTICS BUT TRULY MINERALIZE INTO CO-2.
SO I THINK THERE'S LOTS OF FUNDAMENTAL RESEARCH AND OPPORTUNITIES IN THIS SPACE.
>> GREAT POINT.
I SHOULD ALSO NOT MENTION ALL PLASTICS ARE BAD.
THERE ARE SOME NATURAL POLYMERS, OF COURSE.
GREAT POINT.
DR. TROTZ, OTHER QUESTION?
>> I'M NOT SURE IF THIS PANELISTS CAN ANSWER IT.
BUT THERE WAS A FOLLOWUP ON MICRO PLASTICS.
AND THERE THERE WAS CONCERN FROM POSSIBLE IMPACTS FROM PEOPLE BREATHING IN WEARING SINGLE USE PLASTIC MASKS DAY IN AND DAY OUT.
>> DOES ANYONE HAVE ANY THOUGHTS?
I DON'T KNOW, DR. IVEY WITH AIR POLLUTION BUT IT'S NOT COMPLETELY RELATED.
>> YOU MIGHT SHOOT THAT BACK TO PANEL TWO OR THREE, SESSION TWO OR THREE.
SO THERE WAS A QUESTION THAT WAS ANSWERED ON Q&A BUT I THINK THERE NEED TO BE CLARIFICATION SO I WILL ASK IT OUT LOUD.
IT WAS HOW DO YOU ACCESS THE WASTE WATER OF POSITIVE PEOPLE?
AND THAT'S FROM SOMEONE NAMED TINA WHITE.
SO DR. HOBBS YOU CAN ANSWER THAT?
>> THERE ARE SEVERAL WAY YOU CAN ACCESS IT.
WHAT WE ARE DOING IS GETTING IT FROM THE LOCAL WASTE WATER TREATMENT PLANT.
SO THESE ARE FROM FINANCIAL AREAS, HOSPITALS, PRISONS, INDUSTRIAL PLANTS THAT ARE NEARBY.
SO ANYWHERE THAT IS IN THIS LOCAL RANGE.
NOW THERE ARE RESEARCHERS THAT ARE GETTING WASTE WATER DIRECTLY FROM BUILDINGS.
OR YOU MAY BE HEARING A LOT THAT DORMS ARE HAVING THEIR WASTE WATER SURVEILLANCE.
SO YOU CAN TAP INTO -- BUILDING FACILITIES CAN ACCESS THE WASTE WATER FROM THAT BUILDING AND BE ABLE TO TEST IT AND SEE IF THERE IS AN OUTBREAK OR POTENTIAL TESTING -- OR MORE TESTING THAT NEEDS TO BE DONE FOR COVID.
SO I THINK THIS QUESTION IS MORE SO RELATED TO THE PRIVACY ISSUE.
SO WE ARE NOT SO MUCH LOOKING AT WHO IS POSITIVE.
JUST LOOKING FOR THE PRESENCE OF THE SARS COV-2 RNA SO WE CAN BE ABLE TO MANAGE IT BETTER.
>> THANK YOU.
>> DR. IVEY WERE YOU GOING TO SAY SOMETHING EARLIER?
I JUST WANT TO MAKE SURE.
ABOUT THE MICRO PLASTICS?
WE'RE GOOD.
SO DR. TROTZ.
NEXT QUESTION.
>> SURE.
THIS IS COMING FROM AEESP'S PRESIDENT, DR. JODIE COST.
HOW DO WE ENCOURAGE COLLEAGUES TO BE THOUGHTFUL ABOUT GREEN CHEMISTRY AND ALSO ENGINEERS WHICH GOES BACK I THINK TO SOME OF THE EQUITY QUESTIONS.
>> I GUESS THAT'S FOR ME.

SO -- I MEAN I THINK THERE'S THIS OPPORTUNITY AGAIN TO BUILD THIS INTO TEXTBOOKS.
THERE'S OPPORTUNITY TO CHANGE SOME OF THE QUESTIONS AROUND CALLS FOR PROPOSALS AND THE THINGS WE ARE ASKED TO RESPOND TO.
SO WHETHER THE IMPACT COULD BE MORE SPECIFIED IN PUSHING INTO THE DIRECTION OF SUSTAINABILITY AND DESIGN.
I'M A GOOD ACADEMIC SO I WILL ALWAYS SAY THE FUNDING AGENCY IS PUTTING IN INCENTIVES FOR INTERDISCIPLINARY COLLABORATION AND IT DRIVES PROFESSORS AND RESEARCHERS TO BEHAVE IN A CERTAIN WAY.
SO THERE'S OPPORTUNITIES TO DO THAT KIND OF WORK THERE.
AND THEN THIS IS -- TO ME, IT'S A MUCH BROADER QUESTION ABOUT -- YOU KNOW STANDARDS WE USE FOR TENURE AND PROMOTION AND HOW WE EVALUATED IN OUR DISCIPLINARITY WORK AND ASKING PEOPLE TO WORK AT THESE INTERFACES IN TERMS OF GETTING -- INTERFACES IN TERMS OF GETTING PEOPLE MORE PRODUCTIVE VERSUS PEOPLE WHO ARE MORE BROAD IN THINKING OF SYSTEMS.
>> THANK YOU.
DR. HOBBS YOU SAID YOU WORKED WITH MECHANICAL ENGINEERS OR OTHER FIELDS.
DO WE HAVE ANY COMMENTS ON COLLEAGUES AND OTHER DISCIPLINES TO BE MORE THOUGHTFUL IN GREEN CHEMISTRY AND SUSTAINABILITY IN.
>> WELL, YES, IN TERMS.
SUSTAINABILITY.
SO IN MARCH OR APRIL THERE WAS A SHORTAGE OF PPE AND SOME COLLEAGUES OF MINE THAT WORK IN THE BIOMEDICAL FIELD, THEY WERE HAVING DIFFICULTIES GETTING PEN TIPS SO WORKING IN THE FIELD OF BIOLOGY OR MEDICAL, YOU TIPICALLY DON'T REUSE PIPETTE TIPS BECAUSE MAYBE YOU ARE WORKING FOR SOMETHING THAT IS STERILE.
SO THIS CALLS INTO QUESTION DO WE NEED TO DISCOVER MORE WAYS WHERE WE CAN RECYCLE AND REUSE PIPETTE TIPS EVEN FOR PEOPLE WHO WORK IN THOSE FIELD, RIGHT.
SO THERE ARE SOME INTERESTING THING THAT ARE COMING FROM THIS.
>> THANK YOU.
DR. TROTZ?
ANOTHER QUESTION.
>> YES.
WE HAVE JEAN MCCRAY WHO HAS BEEN SENDING QUESTIONS EVERY WEEK.
SO THIS IS GREAT.
THANK YOU FOR THAT.
SHE SAYS THANKS TO ALL THE PANELISTS FOR THE GREAT WORK.
AS THE URGENCY OF ACTING TO LIMIT CLIMATE CHANGE INCREASES DO YOU HAVE ANY THOUGHTS ON HOW TO CREATE BUY-IN FOR LARGE SCALE CHANGE?
AGAIN BEYOND OUR FIELD.
WE SEEM A BIT STUCK BETWEEN PEOPLE DIGGING IN THEIR HEELS AND OTHERS PUSHING FOR RAPID CHANGE.
>> DR. SAMARAS?
>> I THINK THAT THERE'S A CLICHE AND A PUNTING WHEN THIS QUESTION COMES UP.
WHICH IS LIKE WELL WE HAVE ALL THE TECHNOLOGY THAT WE WANT.
ALL WE NEED IS POLITICAL WILL.
WELL THE POLITICAL WILL DOESN'T JUST APPEAR OUT OF THIN AIR.
IT NEED TO BE BUILT WITH FOLKS OUTSIDE OF COALITION FOR A LONG TIME AND WHO HAVE BEEN MARGINALIZED SO I DO THINK WE AS ENGINEERS CAN'T AFFORD TO ONLY LOOK AT THE TECH WE HAVE TO THINK ABOUT HOW THE TECH EFFECTS SOCIETY AND HOW THAT MIGHTEN COURAGE A DURABLE COALITION FOR CHANGE.
SO WHAT DOES THAT MEAN?

IT MEANS THAT WHEN WE ARE PROPOSING OR DESIGNING TECH IN OUR PROFESSION, TO UNDERSTAND HOW IT WOULD EFFECT DIFFERENT COMMUNITIES.
BUT ALSO HOW IT MIGHT BENEFIT DIFFERENT COMMUNITIES AND WHAT MIGHT BE A LARGE SCALE PROGRAM FOR CHANGE.
ONE BASELINE IDEA HERE WHILE WE ARE THROWING OUT POLICY IDEAS IS TO MITIGATE THE LEAD AND ASBESTOS FROM WATER LINES AND PUBLIC SCHOOLS AND BUILDINGS AND ALSO REINVEST IN OUR PUBLIC SCHOOL SYSTEM SO THAT WE HAVE -- THAT EVERY COMMUNITY WOULD BE ABLE TO FEEL THE BENEFITS IMMEDIATELY RATHER THAN CONCENTRATING THEM IN SOME LARGE CITIES.
SO WE HAVE TO THINK ABOUT WAYS THAT WE BUILD THAT POLITICAL WILL AS ENGINEERS AND NOT JUST SAY WELL THAT'S SOMEBODY ELSE'S PROBLEM.
>> GREAT POINT.
ANY OTHER PANELISTS WHO HAVE COMMENTS?
I KNOW SOME HAVE THE COMPASS AND THE SPEEDOMETER.
>> I THINK THIS IS EXACTLY WHAT COSTA WAS SAYING.
I THINK -- AND I DON'T WANT TO GET POLITICAL BUT IT REALLY IS MIRRORING CLIMATE CHANGE WITH OTHER SOCIETAL BENEFITS.
SO HOW DOES THIS INTERSECT WITH JOBS.
HOW DOES THIS INTERSECT WITH ISSUES OF EQUITY AND HOW DOUGH WE SOLVE SOCIETAL PROBLEMS THAT ALSO SOLVE OUR CHALLENGES AROUND CLIMATE CHANGE.
SO I THINK THAT HELPS TO BUILD THE POLITICAL WILL IF YOU CAN PIVOT THE CONVERSATION AROUND PROCESS AND HOW WE GET THERE AND INSTEAD TALK ABOUT WHAT IS THE MEANS.
THE ENDS THAT WE ARE TRYING TO REALIZE AND WHAT ARE YOUR DIFFERENT PATHWAYS TO GETTING THERE.
AND MANY OF THOSE WILL WIND UP ALSO BEING BENEFICIAL FOR CLIMATE CHANGE.
SO I THINK WE NEED TO CAN CHANGE THE CONVERSATION TO BUILD THAT KIND OF POLITICAL WILL.
AGAIN I'M A LITTLE BIT BIASED BUT I DO THINK ABOUT HOW CO-2 HAS ECONOMIC VALUE AS AN INDUSTRIAL FEED STOCK CHANGES THE MARK MECHANISMS AROUND CAPTURING CO-2 AND USING IT FOR FUELS FOR CHEMICALS FOR BUILDING MATERIALS AND FOR PLASTICS.
>> GREAT.
DR. TROTZ?
>> THERE IS A FOLLOWUP ON THAT.
I WAS WONDERING IF THE PANELISTS COULD GIVE SOME MORE CONCRETE STEPS OF THING THAT COULD BE TAKEN OF A SOCIETAL AND GOVERNMENTAL LEVEL TO REACH THE NET ZERO EMISSION OR TO ADDRESS THE NET EQUITY ISSUES? SO WHAT ARE THING THAT EITHER AEESP COULD DO OR WE CAN DO AS INDIVIDUAL FACULTY OR PROGRAMS THAT HAVE BEEN SUCCESSFUL TO TRAIN OUR ENGINEERS TO DO MORE OF THIS STUFF?
>> DR. IVEY?
>> IF I HEARD CORRECTLY WHAT ARE THE CONCRETE STEPS WE COULD TAKE -- WAS IT AT THE GOVERNMENT LEVEL OR FACULTY LEVEL?
>> THEY DIDN'T ASK FOR CONCRETES.
IF YOU HAVE ANY INSIGHTS ON THE STEPS THAT COULD BE TAKEN.
SO I WAS WONDERING IF YOU COULD GIVE EXAMPLE OF THING THAT WE ARE ALREADY DOING THAT SHOULD BE AMPLIFIED.
>> I'M GOING TO PIVOT A LITTLE BIT.
THIS MAY BE AN ISSUE OF HOW DIFFERENT ENERGY SECTORS ARE SUBSIDIZED AT THE FEDERAL LEVEL.
IF WE START INVESTING MORE IN THE GREENER AND LOW CARBON INTENSITY OR ZERO CARBON TECHNOLOGIES, INVESTING IN THOSE AND PERHAPS PULLING RESOURCES AWAY

FROM ENERGY PRODUCTION THAT TAKES US AWAY FROM OUR CLIMATE GOALS I THINK THAT'S PROBABLY THE MOST DEAD-ON WAY TO ADDRESS OUR CLIMATE ISSUES.
AND THE MOST THAT WE CAN DO IS CONTINUE TO PRODUCE OUR PAPERS THAT SUPPORT THIS AND PROVIDE THE DATA THAT SUPPORT THIS.
BUT IF THE PEOPLE THAT FUND THESE OPERATIONS DON'T LISTEN TO US, I'M NOT REALLY SURE WHAT WE AS INDIVIDUALS CAN DO TO STOP THESE LARGE SYSTEMS THAT ARE PERTURBING THE CLIMATE.
>> ACTUALLY ONE OF THE INTERESTING THINGS THAT WE FOUND IS -- ACTUALLY ONE OF THE PARTICIPATING WASTE SYSTEMS -- WE HAVE ONE SMALL TOWN FROM NEW YORK.
AND ACTUALLY THEIR TOWN IS ONE OF THE EPA'S ZERO WASTE CITIES.
I'M NOT SURE HOW MANY OF YOU HAVE HEARD ABOUT THIS INITIATIVE.
AND ACTUALLY FOR THEM, RECYCLING IS MANDATORY.
ONE THING THAT WE FOUND VERY INTERESTING IS GENERALLY ONE OF THE BIGGEST CONCERNS IS REDUCTION IN REVENUE BECAUSE OF THE DECREASE IN THE COMMERCIAL WASTE.
AND ALSO GENERALLY, FROM THE RECYCLING PERSPECTIVE, CARDBOARD AND PLASTICS THEY ARE THE MOST VALUABLE MATERIAL FOR RECYCLING.
HOWEVER THEY ARE SO WORRIED ABOUT THE WASTE CONTAMINATION OF THE WORKERS.
BECAUSE GENERALLY AT A TIME WHEN WASTE COMES TO THE FACILITY THEY ARE IN A MIX WITH OTHERS.
SO THEY HAVE TO TOUCH THE MATERIAL.
HOWEVER IN THE CASE OF THE ZERO WASTE CITY, THE NAME OF THE TOWN -- THEY ARE ALREADY -- AT THE TIME WHEN THEY RECEIVE THE MATERIAL THEY ARE ALREADY WELL SEGREGATED FROM THE OTHER MATERIAL.
SO THEY ARE LESS CONCERNED ABOUT THE WASTE CONTAMINATION AND ALSO AT THE SAME TIME THEY ARE ABLE TO -- YOU KNOW RECYCLE THE HIGHEST NUMBER OF THE MATERIALS COMPARED TO THE LONG PANDEMIC SITUATION.
SO I THINK IT LOOKS LIKE MAYBE DOING MORE RECYCLABLE -- I THINK SUSTAINABLE WAYS TO MAKE THE WASTE MANAGEMENT SYSTEM MORE RESILIENT TO THE PANDEMIC.
SO WE ARE GETTING TO THE CONCLUSION RIGHT NOW.
>> GREAT POINT THAT THESE SYSTEMS CAN BE MORE RESILIENT AND NATURAL IN HUMAN-MADE DISASTERS.
DR. HOBBS YOU HAD YOUR HAND RAISED?
>> YES, SO IN THE THEME OF CONDIVERGENT RESEARCH THIS IS A GREAT IDEA TO PARTNER WITH SCIENTISTS WHAT ARE SOME REASONS WHY PEOPLE ARE NOT DOING THIS OR WHY THEY ARE DOING IT.
WE ARE LOOKING AT BYE-IN.
WE LOOKING AT HUMAN BEHAVIOR WE ARE LOOKING AT WHAT PEOPLE ARE COMFORTABLE WITH.
SO LET'S TEAM UP WITH BEHAVIOR SCIENTISTS TO TRY TO UNDERSTAND, DO PEOPLE RESPOND MORE TO INCENTIVES?
OR DO THEY RESPOND MORE TO PENALTIES WHERE THEY HAVE TO PAY A FEE FOR DOING A CERTAIN BEHAVIOR?
BUT I THINK THAT WOULD BE A WAY OR A START TO START ADDRESSING SOME OF THESE ISSUES OR RESISTANCE OR UNCERTAINTY ABOUT CLIMATE CHANGE.
>> THANK YOU.
DR. ZIMMERMAN?
>> I TOTALLY AGREE.
SO I THINK FOR A LONG TIME FOR ENVIRONMENT WE HAVE LARGELY PLAYED HALF A POLICY STRATEGY WHICH HAS BEEN THE REGULATORY SIDE AND WE ARE NOT AS GOOD ON THE INCENTIVES AND VACATION -- ENCOURAGING INNOVATION SIDE AND THERE'S HUGE

POLICY OPPORTUNITIES THERE, WHETHER IT'S RESEARCH DEVELOPMENT TAX CREDITS OR PATENT LIFE EXTENSION.
THIS IDEA OF DRIVING THINGS TOWARDS CONTINUOUS IMPROVEMENT.
THERE'S LOTS OF WORK -- AGAIN A LITTLE BIT OUTSIDE OF THE ENGINEERING REALM.
BUT THINKING ABOUT ACCOUNTING STANDARDS AND BEING INLIED ON STOCK EXCHANGE OR HAVING AN EQUITY AS A COMPANY IN ORDER TO PLAY IN THE PUNISH MARKET.
THERE'S LOTS OF POLICY MAKERS OUT THERE THAT HAVE NOT BEEN EXPLOITED YET AT THAT SCALE LET ALONE THE INDIVIDUAL SCALE AS DR. HOBBS WAS REFERRING TO.
>> ALL GREAT POINTS.
DR. SAMARAS YOU HAD YOUR THUMBS UP?
DID YOU HAVE ANYTHING YOU WANTED TO MENTION?
>> I WAS JUST GIVING AN EMOJI IN REAL LIFE.
>> THANK YOU.
AND OF COURSE THE MUNICIPAL SOLID WASTE IS COMING SO SORRY FOR ANY BACKGROUND NOISE.
DR. SAMARAS I KNOW YOU DO A LOT OF WRITING AND MEDIA AND NEWS ARTICLES.
ARE THERE ANY COMMENTS ABOUT MAKING THIS KIND OF A SOCIETAL AND GOVERNMENT CHANGE THROUGH THAT OR THINGS YOU'VE LEARNED.
>> I THINK ENGINEERS HAVE A LOT OF KNOWLEDGE ON SHELFS, AND WE GET IT PREVIEWED AND GET IT PUBLISHED AND TAKE THESE CONCLUSIONS AND DISTILL THEM AND COMMUNICATE THEM TO THE PUBLIC.
AND IT DOESN'T HAVE TO BE AN EITHER/OR.
WE CAN TRY TO DO ALL OF THIS.
IT NEEDS TO BE RECOGNIZED BY OUR ACADEMIC COMMUNITIES WHICH I THINK IS BECOMING MORE AND MORE.
BUT EVEN INDIVIDUALLY AS RESEARCHERS, YOU KNOW THE COMMUNITY WANTS TO HEAR FROM YOU.
THEY BELIEVE IN THE WORK THAT YOU ARE DOING.
AND YOU HAVE A LOT OF INSTITUTIONAL KNOWLEDGE.
AND YOU COMPARE THAT WITH LOCAL KNOWLEDGE TO MAKE SOME REAL CHANGE IN YOUR COMMUNITY.
SO DON'T BE AFRAID TO PUSH YOUR WORK BEYOND OUR ACADEMIC NETWORKS.
>> GREAT.
THANK YOU.
WE PROBABLY SHOULD CLOSE SOON IS.
THERE ONE LAST QUESTION, DR. TROTZ?
>> THERE'S ONE LAST ONE.
AS WE MOVE AWAY FROM FLUORIDE BASED CHEMICALS HOW CAN WE ASSURE THAT THEIR REPLACEMENTS AREN'T WORSE?
AFTER ALL IT TOOK DECADES TO SHOW THE DETRIMENTAL HEALTH EFFECTS.
>> DR. ZIMMERMAN?
>> I THINK P-FAS, YOU CAN TALK ABOUT ALL OF THESE CHEMICALS THAT WENT THROUGH THE EPA AND INTERNATIONAL CHEMICALS MANAGEMENT POLICY PROGRAMS THAT EMERGED AS VIABLE FOR USE.
AND THEN WE WAIT, RIGHT, FOR PUBLIC HEALTH IMPACT BEFORE WE TURN AROUND AND REGULATE.
SO WE NEED TO CHANGE THAT MODEL.
AND THIS GETS BACK TO THE UNLYING APPROACH TO RISK ASSETSMENT OF WHO CAN BE HARMED AND HOW MUCH.
AND THAT'S HOW MUCH WE ALLOW OUT IN THE ENVIRONMENT FROM A SOCIETAL HARM PERSPECTIVE.

SO LOTS OF NEW TOOLS ARE COMING OUT THAT OUR COMMUNITY HAS A GREAT ROLE TO PLAY AROUND UNDERSTANDING HOW CHEMICALS AND MOLECULES FUNDAMENTALLY INTERACTION WITH BIOLOGICAL SYSTEMS OR NATURAL SYSTEMS.
WHAT IS IT ABOUT THAT MOLECULE IN TERMS OF ITS PHYSICAL, CHEMICAL PROPERTIES.
AND OF THE FUNCTION YOU WANT WITHOUT THOSE HAZARDS.
SO THIS GETS BACK TO ALL THE WORK THAT WE NORMALLY DO AS ENVIRONMENTAL ENGINEERS TO FIGURE OUT TRANSPORT AND OF A MOLECULE BASED ON ITS CHEMICAL PROPERTIES SO USING THAT NOW TO INFORM SAFER DESIGN FROM A TOXICITY PERSPECTIVE.
>> GREAT.
THANK YOU.
OKAY.
WELL I KNOW WE ARE GETTING TO TIME.
SO I WOULD LIKE TO CONCLUDE NOW.
SO THANK YOU TO ALL OF OUR AMAZING PANELISTS FOR THEIR INSIGHTFUL PRESENTATIONS AND ANSWERING QUESTIONS.
WE APPRECIATE ALL OF YOUR OUR ATTENDEES ON ZOOM OR LATER TODAY ASYNCHRONOUSLY.
THANK YOU TO OUR SIGN LANGUAGED INTERPRETERS AND CLOSED CAPTIONER TO HELP MAKE THE SESSION MORE ACCESSIBLE AND THANKS TO THE ORGANIZING COMMITTEE BEHIND THE SCENES AND THANK YOU TO MY GRANDMOTHER.
WITHOUT HER INSPIRATION AND EMPHASIS ON EDUCATION I WOULD NOT BE HERE MODERATING THIS SESSION FOR YOU ALL TODAY.
SO AS WE CLOSE TODAY I INVITE TO YOU CLOSE YOUR EYES AND ENVISION THE FUTURE WITHOUT POLLUTION OR WASTE.
IMAGINE A WORLD WITHOUT LANDFILLS OR LITTER OR FOOD WASTE.
WHERE ALL PRODUCTS AND ITEMS ARE DESIGNED FOR DISASSEMBLY AND A SUSTAINABLE EVERYBODY OF LIFE.
A FUTURE WHERE WE UTILIZE GREEN CHEMISTRY INSTEAD OF TOXIC AND HAZARDOUS CHEMICALS AND I IMAGINE A WORLD WHERE MANY LESS PEOPLE DIE FROM CANCER AND TOXICITY AND AIR POLLUTION.
IMAGINE A WORLD WHERE THE ENVIRONMENT IS CLEAN AND WE ARE NOT FINDING PLASTICS AND TOXINS IN THE BELLIES OF BIRDS AND FISH AND OTHER ANIMALS.
IN THE CONTEXT OF COVID-19 THE NECESSITY OF A FUTURE WITHOUT POLLUTION OR WASTE IS EVER MORE APPARENT.
PARTICULARLY FOR BLACK, HISPANIC, INDIGENOUS AND OTHER UNDERSERVED COMMUNITIES THAT ARE DISPROPORTIONATELY IMPACTED BY WASTE AND POLLUTION AND COVID-19.
THAT FUTURE IS POSSIBLE BEGIN THE TALKS WE HEARD TODAY AND COMMITMENT FROM ENVIRONMENTAL ENGINEERS AND SCIENTISTS AND EVERY DAY CITIZENS LIKE ALL OF YOU LISTENING I CHALLENGE YOU TO COMMIT EVEN MORE AFTER THIS SESSION TO MAKE THAT FUTURE A REALITY.
THANK YOU FOR THE OPPORTUNITY TO BE YOUR MODERATOR TODAY AND I NOW INVITE DR. TROTZ TO CLOSE THE SESSION.
>> THANK YOU, COLLEEN AND THANK YOU TO EVERYONE FOR AN AMAZING SESSION.
WE WOULD LIKE TO REMINDED EVERYONE THAT THEY CAN GO ON THE AEESP CONVERGING COVID-19.ORG OR TAKE A PICK OF THIS QR CODE TO GET TO THE QUIZ THAT ADDRESSES THE -- WITH QUESTIONS FROM THIS SESSION.
AND YOU DO GET CREDIT YOU GET CREDIT FOR ENVISION CREDENTIALS AND YOU ALSO GET A CERTIFICATE FROM AEESP CONVERGING COVID-19.
WE HAVE OUR LAST SESSION THAT COMES NEXT WEEK.

AND WE ARE LOOKING AT CLIMATE CHANGE MITIGATION AND ADAPTATION.
SO TUNE IN AGAIN AT 12 P.M. NEXT FRIDAY.
I WOULD LIKE TO AGAIN THANK OUR SPONSORS.
THE NATIONAL SCIENCE FOUNDATION.
AEESP AND OF COURSE THE UNIVERSITY OF CALIFORNIA MERCED AND UNIVERSITY OF SOUTH FLORIDA AND TO THE STAFF AND STUDENTS WHO ARE BEHIND THE SCENES WORKING ON THIS CONFERENCE.
THANK YOU, EVERYONE.
AND HAVE A SAFE WEEKEND.
AND FROM ALL OF US, COLLEEN, DR. NAUGHTON, A VERY SINCERE CONDOLENCES ON THE PASSING OF YOUR GRANDMOTHER.