

MR. BRAINE: THANK YOU VERY MUCH. GREAT TO
11 BE HERE. I GUESS I'M GLAD I'M HERE INSTEAD OF BEING
12 MY WIFE, DRIVING ALONG THE HIGHWAY, TRYING TO ENJOY
13 THE NICE DAY OUTSIDE. BUT I'M HAPPY THAT I'M HERE.
14 I WANTED TO SHIFT TO TALKING A BIT ABOUT
15 TECHNOLOGY, AND WE'VE HEARD QUITE A BIT WITH
16 RESPECT TO -- AND WE'LL PULL UP MY SLIDES HERE IN A
17 SECOND.
18 WHAT I DO WANT TO TALK ABOUT IS, YOU KNOW,
19 THE TOPIC OF THE PANEL: OPPORTUNITIES AND RISKS WITH
20 RESPECT TO TECHNOLOGY. AS FRED MENTIONED, AEP IS
21 INVOLVED IN A LOT OF DIFFERENT TECHNOLOGY ENDEAVORS.
22 ONE OF THEM IS THE FUTUREGEN PROJECT. WE HAVE A
23 NUMBER OF OTHER PROJECTS THAT I'M GOING TO DESCRIBE
24 IN A LITTLE MORE DETAIL TO YOU.
25 MY FRONT COVER, I'M SHOWING YOU TWO OF OUR

0214

1 POWER PLANTS. BOTH OF THEM WILL BE THE RECIPIENTS,
2 IF YOU WILL, OF TECHNOLOGY IN THE CARBON CAPTURE
3 REALM WITHIN THE NEXT SEVERAL YEARS, AND I THINK IT
4 BEARS A LOT OF WATCHING. THAT'S CERTAINLY HOW THAT
5 TRANSPIRES.
6 FIRST, A FEW NOTES ABOUT OUR COMPANY. AEP
7 IS THE LARGEST GENERATOR OF ELECTRICITY IN THE U.S.,
8 ALTHOUGH OUR INDUSTRY RANK FLUCTUATES BETWEEN NUMBER
9 1 AND NUMBER 2. I THINK WE'RE LISTED THERE AS
10 NUMBER 2. AS YOU CAN SEE, MOST OF OUR MIX IS
11 COAL-FIRED GENERATION, ABOUT TWO-THIRDS. WE DO ALSO
12 HAVE A NUMBER OF NATURAL GAS PLANTS; SOME NUCLEAR
13 CAPACITY; AND A GROWING SEGMENT, ACTUALLY, OF
14 RENEWABLE POWER, PARTICULARLY IN THE WIND AREA.
15 PROBABLY THE BIGGEST CHALLENGE WE HAVE IS
16 THAT WE SERVE 5 MILLION CUSTOMERS SPREAD OUT OVER
17 11 STATES; 11 STATES, ALL OF THEM WITH VERY DIFFERENT
18 OPINIONS ABOUT ENERGY POLICY AND REGULATORY POLICY.
19 AND IN FACT, 10 OF THE 11 STATES THAT WE SERVE ARE
20 STILL, WHAT WE REFER TO IN THE INDUSTRY AS,
21 COST-OF-SERVICE REGULATED; THAT IS, OUR RATES ARE
22 STILL REGULATED AND SET BY STATE PUBLIC UTILITY
23 COMMISSIONS. AND THAT'S ACTUALLY ONE OF THE BIG
24 CHALLENGES ON TECHNOLOGY FOR A COMPANY LIKE AEP, IS
25 WORKING WITH NOT ONLY THE FEDERAL GOVERNMENT, NOT

0215

1 ONLY A LOT OF OUR STAKEHOLDERS AND OUR CUSTOMERS, BUT
2 ALSO WITH OUR REGULATORS AT THE STATE LEVEL TO MAKE
3 SURE THAT WE CAN GO FORWARD ON SOME VERY MAJOR
4 INVESTMENTS.
5 REALLY SINCE THE MID 1990S, AND
6 PARTICULARLY ACCELERATING IN THE EARLY PART OF THIS
7 DECADE, AEP HAS DEVELOPED A CLIMATE STRATEGY, AND
8 WE'VE ALWAYS FELT AND REALLY CONTINUE TO FEEL
9 STRONGLY THIS WAY THAT IT IS IMPORTANT FOR US, AS A
10 COMPANY, TO BE VERY PROACTIVE AND ENGAGE IN THE
11 DEVELOPMENT OF CLIMATE POLICY IN THE U.S. YOU'LL
12 HEAR A LOT MORE, I THINK, ABOUT SOME OF THE REGIONAL

13 AND STATE-LEVEL POLICIES AROUND THE COUNTRY I THINK
14 IN SESSIONS ON FRIDAY. WE'RE NOT THAT ENAMORED WITH
15 STATE-LEVEL POLICY. WE THINK IT IS VERY IMPORTANT
16 THAT WE HAVE COMPREHENSIVE U.S. FEDERAL POLICY,
17 ALTHOUGH I THINK IN MANY CASES THE STATE POLICIES,
18 THE HEART IS IN THE RIGHT PLACE, SO TO SPEAK; BUT I
19 THINK IT BECOMES MUCH MORE DIFFICULT TO DEAL WITH
20 SORT OF A PATCHWORK QUILT OF REGULATION.

21 AS A RESULT WE HAVE BEEN VERY ACTIVE IN A
22 VARIETY OF ORGANIZATIONS. I SERVE ON THE BOARD OF
23 DIRECTORS OF THE CHICAGO CLIMATE EXCHANGE, THE
24 INTERNATIONAL EMISSIONS TRADING ASSOCIATION, WHICH
25 ARE ACTIVELY REALLY PROMOTING COST-EFFECTIVE WAYS AND
0216

1 SOLUTIONS FOR REDUCING EMISSIONS.

2 WE ARE ALSO DOING A GREAT DEAL OF INVESTING
3 IN SCIENCE AND TECHNOLOGY, R AND D, AND I WILL GET
4 INTO SOME MORE DISCUSSION OF SOME OF THOSE PROJECTS.
5 WE ARE THEN, ALSO, TAKING ACTION NOW. I WILL TALK
6 MORE ABOUT THE CHICAGO CLIMATE EXCHANGE IN A SECOND,
7 AND YOU'LL, OBVIOUSLY, HEAR A LOT MORE ABOUT THAT
8 WHEN MIKE WALSH FINALLY GETS IN FROM CHICAGO. I
9 UNDERSTAND HE IS DELAYED TODAY. HE WILL BE TALKING
10 ABOUT THAT MORE TOMORROW. AND AS WELL AS, OBVIOUSLY,
11 TAKING ACTION IN TERMS OF REDUCTIONS THAT WE MAKE IN
12 OUR SYSTEM, YOU'VE GOT TO INVEST IN THE LONGER-TERM
13 TECHNOLOGY SOLUTIONS, AND PARTICULARLY FOR US, THAT
14 IS IN NEW COAL TECHNOLOGY.

15 WE HAVE A POSITION WITH RESPECT TO FEDERAL
16 LEGISLATION WHICH IS THAT WE SUPPORT FEDERAL
17 LEGISLATION THAT PROVIDES A CERTAIN AND CONSISTENT
18 NATIONAL POLICY, THAT HAS CARBON CONTROLS AND
19 GREENHOUSE GAS EMISSION REDUCTIONS WITH A
20 COMPREHENSIVE APPROACH THAT LOOKS AT THE ENTIRE
21 ECONOMY. WE'RE NOT IN FAVOR OF PROGRAMS THAT JUST
22 FOCUS ON THE ELECTRIC UTILITY SECTOR, AND THERE ARE
23 SOME BILLS THAT DO THAT, FOR EXAMPLE. WE THINK IT IS
24 IMPORTANT TO DO THE ENTIRE ECONOMY BECAUSE THE
25 UTILITY SECTOR, ALBEIT ONE OF THE LARGEST SOURCES OF
0217

1 GREENHOUSE GASSES, IS ABOUT A THIRD OF THE TOTAL U.S.
2 GREENHOUSE GASSES. SO YOU NEED TO DEAL WITH THE
3 OTHER TWO-THIRDS, AS WELL.

4 WE WANT TO PROMOTE PROGRAMS THAT ARE
5 COST-EFFECTIVE, PROVIDE SOME REALISTIC EMISSION
6 CONTROL OBJECTIVES AND TARGETS AND TIME TABLES, BEING
7 VERY IMPORTANT THERE. YOU DO NEED TIME FOR
8 TECHNOLOGIES TO DEVELOP. MONITORING, VERIFICATION
9 AND ADJUSTMENT MECHANISMS, VERY IMPORTANT.
10 OBVIOUSLY, YOU'RE HEARING A LOT ABOUT THE MEASUREMENT
11 RECORD. WELL, IN WHAT WE'RE STRIVING TO DO,
12 MONITORING AND VERIFICATION IS VERY CRITICAL. AND
13 THEN, FINALLY AND LAST BUT NOT LEAST, TECHNOLOGY
14 DEVELOPMENT AND DEPLOYMENT.

15 WE HEARD A LITTLE BIT OF SOME COMMENTS,
16 CERTAINLY TODAY, ABOUT THE DEVELOPING WORLD, ITS
17 SIGNIFICANCE, CERTAINLY, IN GREENHOUSE GASSES,

18 CHINA'S SURPASSING THE UNITED STATES AND, OBVIOUSLY,
19 THE RAPID GROWTH IN THE DEVELOPING WORLD. AND SO WE
20 THINK THAT ANY POLICY OUGHT TO HAVE PROVISIONS THAT
21 DEAL WITH THE DEVELOPING WORLD, AT LEAST FROM THE
22 STANDPOINT OF IMPORTS INTO THE U.S., AND THAT WOULD
23 BE IF THE DEVELOPING WORLD DOESN'T TAKE ACTIONS
24 WITHIN SOME LENGTH OF TIME, REASONABLE LENGTH OF TIME
25 THAT ANY U.S. LEGISLATION . . .

0218

1 (THUNDER)
2 THAT WAS PROBABLY CHINA AND INDIA . . .
3 (LAUGHTER)

4 I WON'T TALK ANY MORE ABOUT THAT PROVISION.
5 WE LOOK AT PROPOSED LEGISLATION, AND WE
6 LOOK AT A VARIETY OF EMISSION REDUCTION PROGRAMS THAT
7 ARE OUT THERE; AND I THINK TWO OF THE MORE IMPORTANT
8 ONES TO KEEP AN EYE ON ARE OBVIOUSLY LIEBERMAN/WARNER
9 ON THE SENATE SIDE, WHICH IS THE SUBJECT OF MARK-UP
10 RIGHT NOW, AS WELL AS BINGAMAN AND SPECTER, WHICH A
11 NUMBER OF COMPANIES AND OTHERS SUPPORTED, INCLUDING
12 AEP AND INCLUDING EXELON, AS A MECHANISM. BOTH OF
13 THEM GET PRETTY SIGNIFICANT REDUCTIONS OUT OVER TIME
14 AND ARE IMPORTANT TO SORT OF LOOK AS FAR AS FRAMING
15 WHAT THE POTENTIAL POLICIES WILL BE DOWN THE ROAD.

16 SO ONE OF THE THINGS THAT A NUMBER OF
17 PEOPLE HAVE DONE -- PROFESSOR SOCOLOW IS GOING TO
18 TALK ABOUT THIS LATER ON, HIS VERY FAMOUS WEDGES, I
19 LIKE TO ALWAYS REFER TO -- BUT EPRI, ELECTRIC POWER
20 RESEARCH INSTITUTE, DID SOME ANALYSIS USING WHAT THEY
21 CALL THE PRISM ANALYSIS; AND THIS WAS LOOKING, AGAIN,
22 AT A VARIETY OF POSSIBLE ACTIONS THAT COULD BE TAKEN,
23 AGGRESSIVE BUT CERTAINLY ALL ATTAINABLE WITHIN THE
24 TIME FRAME BETWEEN NOW AND, AS YOU CAN SEE, 2030, AND
25 I THINK THE MOST IMPORTANT THING IS IT IS, IN FACT, A

0219

1 RAINBOW OF DIFFERENT COLORS, IT IS A DIFFERENT SET OF
2 ACTIONS THAT HAVE TO BE TAKEN. NO ONE METHOD,
3 WHETHER IT IS NUCLEAR GENERATION, WHETHER IT IS
4 RENEWABLES, WHETHER IT IS EFFICIENCY, WHETHER IT IS
5 PLUG-IN HYBRID ELECTRIC VEHICLES -- AND FOR THOSE OF
6 YOU WHO THINK THAT WE DON'T HAVE OUR OWN ACRONYMS IN
7 OUR INDUSTRY, WE HAVE PHEV'S -- AS WELL AS
8 DISTRIBUTED ENERGY AND CARBON CAPTURE AND
9 SEQUESTRATION. SO YOU CAN SEE A WHOLE VARIETY OF
10 METHODS. NOW, ONE OF THE THINGS THAT DOES STAND OUT
11 IN THAT GRAPH IS THAT BECAUSE OF ITS POTENTIAL REACH,
12 IS THE CARBON CAPTURE AND SEQUESTRATION IS A VERY
13 IMPORTANT ONE. THAT'S THE AREA IN ORANGE.

14 AEP IS REALLY FOLLOWING ALONG THAT SAME
15 PATH. WE VIEW THAT IT IS GOING TO TAKE A PORTFOLIO
16 OF ACTIONS IN THE LONG RUN TO, FIRST, SLOW THE RATE
17 OF GROWTH IN CO2 EMISSIONS THAT IS OCCURRING
18 EVERYWHERE IN OUR SECTOR, AND THEN TO REVERSE AND TO
19 REDUCE EMISSIONS SIGNIFICANTLY. AND THE QUADRANTS
20 REALLY ARE, YOU KNOW, FOCUSING THE RENEWABLES AREA --
21 AND I WILL TALK A BIT ABOUT WHAT WE'RE DOING THERE,
22 PARTICULARLY IN THE WIND AREA -- CONTINUING TO STRIVE

23 TO IMPROVE EFFICIENCY, AND IT IS EFFICIENCY OF ALL
24 TYPES. END-USE EFFICIENCY; CLEARLY PROGRAMS THAT
25 HELP PROMOTE CONSERVATION; PUSHING FOR CONTINUING
0220

1 TIGHTENING APPLIANCE EFFICIENCY STANDARDS IN THE
2 U.S., AS WELL AS BUILDING CODES. PROBABLY IT
3 WOULDN'T SURPRISE YOU TO KNOW THAT IN THE U.S., WE
4 HAVE STATES WITH LIKE FIFTY DIFFERENT TYPES OF
5 BUILDING CODES LITERALLY, AND THERE ARE SOME STATES
6 THAT COULD REALLY PUSH THAT ENVELOPE QUITE A BIT
7 FURTHER, AND STATES LIKE CALIFORNIA THAT ARE PRETTY
8 FAR ADVANCED. THAT MAKES A VERY BIG DIFFERENCE IN
9 THE LONG RUN IN ENERGY USAGE, AND IT IS VERY
10 IMPORTANT.

11 ALSO, ON THE SUPPLY SIDE, AEP HAS BEEN
12 WORKING IN ITS POWERS PLANTS TO CONTINUE TO SQUEEZE
13 OUT, IF YOU WILL, MORE KILOWATT HOURS WITH THE SAME
14 AMOUNT OF FUEL THAT'S INPUT INTO THE PLANT, IMPROVING
15 THE EFFICIENCY OF THOSE PLANTS. THERE CONTINUE TO BE
16 SOME POSSIBILITIES TO DO THAT AS TECHNOLOGY CONTINUES
17 TO ADVANCE THERE.

18 THE THIRD AREA ON THE LEFT SIDE IS
19 OFF-SYSTEM REDUCTIONS. I'M GOING TO TALK ABOUT ONE
20 EXAMPLE OF THAT WHERE WE'RE WORKING ON RIGHT NOW AND
21 RECENTLY DID A FAIRLY SIGNIFICANT DEAL ON. BUT
22 FORESTRY IS AN AREA WE'VE WORKED IN TRADITIONALLY.
23 IT'S CERTAINLY AN AREA TO CONSIDER. AND I DON'T WANT
24 TO NOT MENTION THE -- I BELIEVE IT'S ONE OF THE
25 LARGEST, IF NOT CLOSE TO THE LARGEST, SOURCE OF
0221

1 GREENHOUSE GAS EMISSION, WHICH IS DEFORESTATION
2 AROUND THE WORLD, AND ACTIONS REALLY NEED TO BE TAKEN
3 IN THE VARIOUS PROTOCOLS AND WHAT WE'RE DOING
4 INTERNATIONALLY TO START TO PROVIDE INCENTIVES FOR
5 PEOPLE TO INVEST IN PRESERVING TROPICAL RAINFORESTS.
6 IT'S FOR ALL KINDS OF REASONS, BUT CERTAINLY CLIMATE
7 CHANGE IS A GOOD ONE.

8 AND THEN, FINALLY, COMMERCIAL SOLUTIONS FOR
9 NEW GENERATION AND THEN CARBON CAPTURE AND STORAGE
10 TECHNOLOGY, AND THAT'S WHAT I'LL BE FOCUSING MOST OF
11 MY DISCUSSION ON.

12 SO OUR PORTFOLIO APPROACH -- AND I'M NOT
13 GOING TO GET INTO ALL THE DETAILS HERE -- BUT THIS IS
14 SOME OF THE ACTIONS THAT WE HAVE BEEN TAKING ON THE
15 LEFT SIDE. OUR EXISTING PROGRAMS, WE'VE ACTUALLY
16 SQUEEZED OUT SEVERAL PERCENT OF EFFICIENCY IN OUR
17 PLANTS. OUR MAJOR AND LARGER PLANTS ARE
18 1,300-MEGAWATT-SIZE UNITS. LITERALLY IN THE PAST
19 FIVE YEARS, WE HAVE ALREADY A SIGNIFICANT AMOUNT OF
20 RENEWABLE ENERGY, PARTICULARLY WIND POWER. WE ARE
21 DOING A LOT IN THE FORESTRY AREA BY PLANTING OVER
22 63 MILLION TREES, WHICH IS SORT OF A MIND-BOGGLING
23 TOTAL, AND WE HAVE DONE QUITE A BIT IN FORESTRY
24 INTERNATIONALLY IN COUNTRIES LIKE BOLIVIA, BELIZE,
25 AND BRAZIL.

0222

1 BUT FINALLY, WE HAVE BEEN PARTICIPANTS IN

2 THE CHICAGO CLIMATE EXCHANGE, AND IN THAT COMMITMENT,
3 WHICH WE STARTED IN 2002 OR THE END OF 2002, OVER THE
4 10-YEAR PERIOD, 2003 TO 2010, ALREADY THROUGH 2005 WE
5 HAD REDUCED 31 MILLION METRIC TONS OF CO2 WITH ANOTHER
6 15 MILLION TONS TO GO.

7 THE NEW PROGRAMS, ONE OF THE THINGS THAT
8 OUR CEO ANNOUNCED REALLY THIS SPRING WAS A DESIRE FOR
9 US TO GO BEYOND OUR CCX COMMITMENT, REDUCE ANOTHER
10 5 MILLION TONS PER YEAR STARTING IN 2011, WITH A
11 COMBINATION OF ACTIONS. A BIG PART OF THAT WILL BE
12 INVOLVING US INVESTING IN WIND POWER THROUGH A
13 VARIETY OF POWER PURCHASE AGREEMENTS, PARTICULARLY IN
14 THE EASTERN PART OF OUR SYSTEM, WHICH WILL GET US
15 ABOUT 2 MILLION TONS OF THAT A YEAR; ANOTHER
16 2 MILLION TONS COMING FROM DOMESTIC OFFSET PROJECTS;
17 AND THE REMAINING COMING FROM FORESTRY, FROM OUR
18 FLEET VEHICLE REDUCTIONS, AS WELL AS ADDITIONAL
19 ACTIONS IN END-USE AND SUPPLY EFFICIENCY. IN THE
20 LONG RUN NEW TECHNOLOGY, PARTICULARLY IN THE AREAS OF
21 ADDING CAPACITY SUCH AS INTEGRATED GASIFICATION
22 COMBINE CYCLE, OR IGCC, OR ULTRA-SUPERCritical OR USC
23 POWER PLANTS, AS WELL AS COMMERCIAL SOLUTIONS FOR
24 CARBON CAPTURE IN OUR EXISTING FLEET, AGAIN WHICH
25 I'LL TALK MORE ABOUT IN JUST A MINUTE.

0223

1 IN THE WIND AREA WE HAVE A HISTORY OF WIND
2 POWER, WHERE THE WIND BLOWS QUITE FREQUENTLY AND
3 QUITE WELL, AND THAT'S IN WEST TEXAS, AND THOSE
4 PROJECTS ARE ALL, AS YOU CAN SEE, LISTED IN WEST
5 TEXAS; BUT WE HAVE NOW ADDED AND AUGMENTED TO THAT
6 EASTERN WIND, WHICH WE ARE PUTTING IN THROUGH POWER
7 PURCHASE AGREEMENTS IN AREAS LIKE INDIANA AND WEST
8 VIRGINIA AND VIRGINIA, AGAIN TO REACH A TOTAL OF
9 1,000 MEGAWATTS OF WIND BY 2011.

10 ONE OF THE PROJECTS THAT WE DID, WHICH GOT
11 ME IN A LOT OF JOKES IN MY OWN FAMILY, MY TEENAGE
12 DAUGHTERS THOUGHT THIS WAS REALLY FUNNY THAT DADDY
13 GOT QUOTED, YOU KNOW, ON A COWS-FOR-CREDITS
14 AGRICULTURAL METHANE MANURE PROJECT, IF YOU WILL. IT
15 IS A PROJECT THAT WE DID WITH A GROUP CALLED
16 ENVIRONMENTAL CREDIT CORP, WHERE WE ANNOUNCED JUST
17 BACK IN JUNE THAT WE WOULD BE OFFSETTING ABOUT
18 600,000 TONS OR ALMOST .6 MILLION TONS PER YEAR, AND
19 MOST OF THAT WILL COME IN OUR STATES THAT WE SERVE
20 BECAUSE WE WANT TO WORK CLOSELY WITH A LOT OF OUR
21 FARMERS, AND SO THAT'S ABOUT A THIRD OF OUR
22 2-MILLION-TON OFFSET COMMITMENT.

23 INCIDENTALLY, I HAVE A FUNNY STORY ON THAT,
24 WHICH IS THAT PRIOR TO WORKING ON THIS WHOLE AREA ON
25 COW METHANE RECOVERY PROCESS, WHICH IS A VERY SIMPLE

0224

1 PROCESS, BY THE WAY. IT IS SIMPLY A COVER THAT GOES
2 OVER THESE MANURE PONDS, IF YOU WILL, AND THEN A
3 FLARE THAT JUST FLARES OFF THE METHANE, AND THAT, OF
4 COURSE, METHANE WITH 23 TIMES THE GLOBAL WARMING
5 POTENTIAL OF CO2, THAT IS A PRETTY GOOD TRADE-OFF,
6 VERY HAPPY TO FLARE THAT OFF IN TERMS OF GREENHOUSE

7 GASSES. BUT WE WERE WORKING ON CHICKEN LITTER OR
8 POULTRY MANURE, IS THE RIGHT TERM, SEVERAL YEARS AGO;
9 AND ONE OF OUR PROJECT MANAGERS WANTED TO SET UP A
10 LUNCH FOR A LOT OF PEOPLE WHO WOULD BE INVOLVED IN
11 THE PROJECT, AND HE SENT OUT A NOTICE AND SAID THAT
12 THE POULTRY MANURE LUNCH WOULD BE IN ROOM . . .

13 (LAUGHTER)

14 EVERYONE WENT, "I'M NOT SURE I WANT TO GO
15 TO THAT LUNCH, SORRY."

16 IN TECHNOLOGY, WE ARE, AS I MENTIONED,
17 FOCUSING ON IGCC AND ULTRA-SUPERCRITICAL CAPACITY.
18 WE JUST GOT APPROVAL IN ARKANSAS TO GO AHEAD AND
19 START BUILDING THE FIRST ULTRA-SUPERCRITICAL PLANT IN
20 THE U.S. THIS IS THE MOST EFFICIENT COAL-FIRED POWER
21 PLANT BUILT IN THE UNITED STATES. AND THEN IGCC,
22 WE'RE STILL TRYING TO GET APPROVAL TO GO AHEAD IN
23 BOTH WEST VIRGINIA AND OHIO TO BUILD IGCC PLANTS. NO
24 IGCC PLANTS EXIST IN THE U.S. AT A LARGE-SCALE SIZE,
25 600-MEGAWATT SIZE, THEY ARE ALL ABOUT 200-MEGAWATT

0225

1 SIZES TODAY, AND THERE IS A BIG DIFFERENCE IN SCALING
2 UP THAT TECHNOLOGY. IT'S VERY IMPORTANT TO BUILD
3 THOSE. AND THEN THE FUTUREGEN PROJECT, WHICH FRED
4 ALREADY DISCUSSED.

5 THE KEY THEN, AFTER THAT, IS THE CO2
6 CAPTURE TECHNOLOGIES. IF YOU BUILD THE NEW
7 TECHNOLOGIES, THEN YOU NEED TO BE LOOKING AT THE
8 CAPABILITIES TO CAPTURE CO2. AND I THINK THE WAY TO
9 THINK ABOUT IT, AND I WILL NOT GET INTO A LOT OF THE
10 DETAILS HERE, BUT SIMPLY TO POINT OUT THAT THERE ARE
11 REALLY THREE BROAD WAYS TO DO THIS. THE FIRST IS THE
12 WAY IT IS ACTUALLY DONE IN SOME COMMERCIAL
13 APPLICATIONS TODAY, THROUGH AMINE-BASED TECHNOLOGIES
14 THAT CAPTURE CO2 AT THE BACK END OF A POWER PLANT OR A
15 FACILITY THAT IS BURNING FOSSIL FUEL, AND BASICALLY
16 IT'S CAPTURING LOW CO2 CONCENTRATION IN THE FLUE GAS.
17 IT IS PRETTY DIFFICULT. IT RESULTS IN A VERY HIGH
18 PARASITIC DEMAND. WHAT THAT BASICALLY MEANS IS THAT
19 THE ENERGY REQUIREMENTS ARE 25, 30 PERCENT ABOVE AND
20 BEYOND WHAT YOU'RE USING CURRENTLY AT YOUR FACILITY.
21 SO LITERALLY IF YOU PUT IN THIS TECHNOLOGY, YOU HAVE
22 TO BUILD 30 PERCENT MORE OF A POWER PLANT NEXT DOOR
23 TO MEET THAT PARTICULAR DEMAND. SO THAT PARASITIC
24 DEMAND IS A PRETTY LIMITING ASPECT IN THE
25 CONVENTIONAL AMINE TECHNOLOGIES. NOW, ONE OF THE

0226

1 THINGS THAT WE'RE VERY EXCITED ABOUT -- I WILL TALK
2 MORE ABOUT IT IN A SECOND -- IS CHILLED AMMONIA,
3 WHICH AS YOU CAN SEE FROM THE NUMBERS THERE WOULD
4 KNOCK THAT PARASITIC LOAD DOWN BY MORE THAN HALF IF ALL
5 GOES WELL, AND WE'RE AGAIN VERY OPTIMISTIC THAT IT
6 WILL.

7 THE SECOND WAY THAT YOU CAN REDUCE CO2 IS
8 THROUGH A MODIFIED COMBUSTION PROCESS WHERE YOU'RE
9 BURNING COAL IN A MORE PURE OXYGEN ENVIRONMENT, AND
10 THAT GIVES YOU A HIGHER CO2 CONCENTRATION, IT GETS RID

11 OF THE NITROGEN, OBVIOUSLY, IN THE AIR. BUT IT STILL
12 HAS A PRETTY HIGH PARASITIC DEMAND.

13 AND THEN THE THIRD METHOD IS THROUGH
14 PRECOMBUSTION CAPTURE, THIS IS THE FUTUREGEN PROCESS
15 THAT FRED WAS TALKING ABOUT, WHICH IS THE
16 WATER-GAS-SHIFT PROCESS. AND AGAIN, I'M JUST A POOR
17 MBA, AS THEY SAY, AND I'M GETTING BEYOND MY TECHNICAL
18 CAPABILITIES VERY QUICKLY, SO I WON'T TRY TO FOOL YOU
19 . BUT IT HAS LOWER PARASITIC
20 DEMAND AND LOWER COSTS; AND LOGICALLY, IF YOU CAN
21 GASIFY COAL, YOU'RE GOING TO HAVE A MORE CONCENTRATED
22 STREAM, AGAIN, THAT YOU CAN CAPTURE THE CO2 FROM, AND
23 THAT'S GOING TO BE AN ADVANTAGE IN A CO2 CAPTURE
24 PROCESS IN TERMS OF ITS ECONOMICS.

25 AND THIS IS JUST A GRAPHIC, FOLLOWING FROM
0227

1 THE BOTTOM OF THAT CHART UP NOW, THE FUTUREGEN
2 PROCESS, THE WATER-SHIFT PROCESS, AS YOU CAN SEE; AND
3 AGAIN, THESE ARE ALL AVAILABLE, SO I WON'T BELABOR
4 THIS GIVEN TIME. BUT, BASICALLY, IT IS A PROCESS
5 WHERE YOU SEPARATE OUT POLLUTANTS, INCLUDING SULFUR,
6 BUT YOU ALSO SEPARATE OUT THE CO2 AND THEN YOU TAKE
7 THE CO2 AND EITHER PUMP IT UNDERGROUND OR USE IT FOR
8 OTHER PURPOSES, AND THEN IT PRODUCES HYDROGEN AS YOUR
9 END PRODUCT, AND THAT CAN BE USED FOR TRANSPORTATION
10 OR IT CAN BE USED DIRECTLY TO FUEL, AS IT DOES, THE
11 ELECTRICITY GENERATOR AT THE PLANT.

12 AND THEN THE OXY-COAL PROCESS, THIS IS
13 WHERE YOU DO A MODIFIED COMBUSTION CAPTURE PROCESS,
14 ACTUALLY PULLS IN, AS YOU CAN SEE, PURE OXYGEN; IT
15 SEPARATES OUT THE NITROGEN; AND THEN ALLOWS FOR AN
16 ENVIRONMENTAL CLEANUP, GETTING RID OF THE SO2, THE
17 ASH, EVERYTHING, ALL DURING THE COMBUSTION PROCESS,
18 AND THEN, AGAIN, ALLOWS FOR THE CAPTURE A LITTLE BIT
19 EASIER FOR CO2.

20 AND THEN YOU HAVE THE POST-COMBUSTION
21 CAPTURE PROCESS, AND THIS IS SOMETHING WE'RE WORKING
22 ON WITH OUR PARTNER ALSTOM CALLED CHILLED AMMONIA,
23 AND THIS INVOLVES ACTUALLY COOLING DOWN THE FLUE GAS
24 LITERALLY SO THAT YOU HAVE A BETTER CAPABILITY OF
25 CAPTURING CO2, AND I'LL GET BEYOND MY TECHNICAL

0228

1 CAPABILITIES ON THAT ONE VERY QUICKLY, AS WELL.
2 SUFFICE IT TO SAY, THAT HAS A LOT OF PROMISE.

3 AND, OF COURSE, ONCE YOU'VE CAPTURED THE
4 CO2, YOU'VE GOT TO DO SOMETHING WITH IT. ONE OF THE
5 THINGS WE WILL BE DOING IS ACTUALLY SELLING CO2 TO AN
6 OIL PRODUCER AT OUR PLANT IN OKLAHOMA, AND I WILL
7 TALK MORE ABOUT THAT IN A SECOND. SO ONE OF THE
8 THINGS YOU CAN DO IS ACTUALLY SELL IT AND USE IT FOR
9 ENHANCED OIL RECOVERY. BUT MORE THAN LIKELY MOST OF
10 THE CO2, IN FACT, THE VAST MAJORITY AS WE GO OUT IN
11 THE FUTURE WHEN WE DO A LOT OF CARBON CAPTURE
12 PROJECTS, IT IS GOING TO HAVE TO BE INJECTED
13 UNDERGROUND.

14 THIS IS A GRAPHIC, WHICH WAS QUITE
15 INTERESTING, BECAUSE WE DID A LOT OF TESTING AT OUR

16 MOUNTAINEER SITE, WHICH IS WHERE WE'RE GOING TO DO
17 OUR FIRST DEMONSTRATION OF THIS CHILLED AMMONIA
18 PROCESS; AND WHAT WE FOUND WAS WHERE WE THOUGHT THE
19 BEST PLACE TO PUT THE CO2 ACTUALLY TURNED OUT NOT TO
20 BE THE BEST PLACE, AND WE STARTED OUT WITH A
21 PROMINENT RESERVOIR, AS YOU CAN SEE WAY, WAY
22 UNDERGROUND, LITERALLY AT ALMOST 10,000 FEET
23 UNDERGROUND, AND IT TURNED OUT THAT A ZONE THAT WAS
24 SOMEWHAT ABOVE THAT TURNED OUT TO BE THE BETTER
25 THING, AGAIN SHOWING THE IMPORTANCE OF TESTING AND A
0229

1 LOT OF THE R AND D WORK THAT YOU HAVE TO DO TO MAKE
2 SURE THIS REALLY WORKS WELL.

3 WE ANNOUNCED OUR CARBON CAPTURE AND STORAGE
4 INITIATIVE IN MARCH OF 2007. THAT INVOLVED A CHILLED
5 AMMONIA PROCESS THAT I'VE ALREADY DISCUSSED THAT WE
6 WOULD BE INSTALLING AT TWO COAL POWER PLANTS, ONE AT
7 OUR MOUNTAINEER PLANT, IT'S SORT OF AT A
8 PRODUCT-VALIDATION PHASE, IT'S AT A MUCH SMALLER
9 SCALE, WHERE WE'RE ONLY GOING TO TAKE SOME OF THE
10 FLUE GAS FROM THAT; AND THEN THE SECOND AND
11 NORTHEASTERN WILL BE A FULL-SCALE COMMERCIAL PROJECT
12 AT ROUGHLY A 400-MEGAWATT-SIZE UNIT, SO A FAIRLY
13 LARGE UNIT. AND THEN OXY-COAL, WHICH WILL BE A
14 LITTLE BIT FURTHER ALONG IN THE PROCESS, AND WE'LL BE
15 LOOKING TO DO THAT AND DEMONSTRATE THAT, FIRST, AT A
16 10-MEGAWATT SIZE AND THEN, ULTIMATELY, AT SOME OF OUR
17 SMALLER UNITS IN OUR SYSTEM PAST 2010.

18 AND HERE IS THE PHASE 1 AND PHASE 2 OF THE
19 CHILLED AMMONIA PROCESS, SOME OF THE BASIC NUMBERS.
20 WE'RE GOING TO BE DOING A 20-MEGAWATT SCALE, ABOUT
21 1,300 MEGAWATTS. THIS IS GOING TO COME AFTER WEN'S
22 ENERGY DEMONSTRATION UP IN WISCONSIN. THAT WILL BE
23 HAPPENING WE HOPE LATER ON THIS YEAR, IF NOT EARLY
24 NEXT YEAR. AND THEN WE WILL BE DOING THE
25 450-MEGAWATT-SIZE NORTHEASTERN PLANT. WE WILL BE
0230

1 BASICALLY CAPTURING AND SEQUESTERING ABOUT A MILLION
2 AND A HALF TONS OF CO2 A YEAR, SO A PRETTY SUBSTANTIAL
3 SIZE PROJECT. AND AGAIN, NOW WE ALREADY HAVE A
4 CONTRACT FOR THE CO2 FROM THAT TO GO INTO ENHANCED OIL
5 RECOVERY AND GO UNDERGROUND THAT WAY.

6 THE BOTTOM LINE, THOUGH, WITH THESE
7 TECHNOLOGIES IS THE COST, AND THE REAL TRICK IS GOING
8 TO BE TO TRY AND DRIVE THESE COSTS DOWN. RIGHT NOW,
9 CARBON CAPTURE WITH SEQUESTRATION IS UP AT THE
10 \$40-A-TON PLUS REMOVED AREA, AND YOU CAN SEE LISTED A
11 NUMBER OF OTHER OPPORTUNITIES, AND MOST OF THEM ARE
12 CHEAPER. THE PROBLEM WITH MOST OF THE OTHER
13 OPPORTUNITIES IS THEY'RE ALSO QUITE LIMITED; AND WHEN
14 YOU WANT TO TRY AND MAKE HUGE REDUCTIONS IN CO2 -- AND
15 ULTIMATELY I THINK WE'RE GOING TO HAVE TO MAKE HUGE
16 REDUCTIONS IN CO2 -- YOU REALLY HAVE TO DO SOMETHING
17 LIKE CARBON CAPTURE OR, FOR THAT MATTER, YOU HAVE GOT
18 TO BE BUILDING NON-FOSSIL PLANTS LIKE NUCLEAR.

19 SO THE GOAL IS GOING TO BE TO DRIVE THOSE
20 COSTS DOWN. IT'S GOING TO TAKE A LOT OF R AND D,

21 IT'S GOING TO TAKE WORK, IT'S GOING TO TAKE
22 DEMONSTRATIONS, AND IT'S GOING TO TAKE A NUMBER OF
23 YEARS FOR THAT TO HAPPEN. BUT AGAIN, WE'RE
24 OPTIMISTIC THAT THAT WILL HAPPEN WITH CONTINUED WORK
25 AND EFFORT ON OUR PART.

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1 I THINK THAT KIND OF LEADS US TO SORT OF
2 THE FINAL BOTTOM LINE AND SORT OF THE CONCLUSION,
3 WHICH IS THAT THE KEY ISSUES REALLY FOR CARBON
4 CAPTURE AND STORAGE AND SEQUESTRATION DEVELOPMENT IS
5 TO OVERCOME THE ECONOMIC HURDLES. RIGHT NOW THE
6 ECONOMIC HURDLES ARE VERY HIGH. WE LIVE IN A WORLD
7 IN OUR STATES AT LEAST WHERE WE HAVE TO GET
8 EVERYTHING APPROVED BY A REGULATORY COMMISSION IN THE
9 STATE, AND THEY'RE LOOKING AT EVERY PENNY IN TERMS OF
10 RATE INCREASES THAT THAT MIGHT RESULT IN. SO, QUITE
11 LITERALLY, THAT ECONOMIC HURDLE BECOMES A BIG, BIG
12 ISSUE WHEN IT COMES TO GETTING THESE PROJECTS DONE
13 AND IN PLACE AND TO DRIVE THOSE COSTS DOWN.

14 THE OTHER THING IS IT INVOLVES A LOT OF
15 HIGH CAPITAL INVESTMENT. IGCC PLANTS COST WELL OVER
16 \$3,000 PER KILOWATT. PLANTS LIKE CARBON CAPTURE AND
17 STORAGE PROJECTS ARE 800 TO 1,000 JUST FOR
18 RETROFITTING THOSE PROJECTS, A VERY SUBSTANTIAL
19 AMOUNT OF CAPITAL, LITERALLY BILLIONS OF DOLLARS FOR
20 SINGLE PLANTS. COMMERCIAL DEMONSTRATIONS ARE GOING
21 TO BE CRITICAL. AND WE DO NEED TO BE WORKING ON
22 THINGS LIKE NATIONAL STANDARDS FOR PERMITTING AND
23 LICENSING DEALING WITH A LOT OF THE LEGAL AND
24 REGULATORY BARRIERS TO CARBON STORAGE TO SORT OF
25 CLEAR THE WAY TO LET THIS HAPPEN AND HAPPEN ON A

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1 TIMELY BASIS BECAUSE TIME IS OF THE ESSENCE.

2 THANK YOU VERY MUCH.

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