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Fourteenth Annual Garrett Morgan Sustainable Transportation Symposium, MTI Report S-14-01

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Fourteenth Annual Garrett Morgan Sustainable Transportation Symposium



MTI Report S-14-01



MINETA TRANSPORTATION INSTITUTE

The Norman Y. Mineta International Institute for Surface Transportation Policy Studies was established by Congress in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). The Institute's Board of Trustees revised the name to Mineta Transportation Institute (MTI) in 1996. Reauthorized in 1998, MTI was selected by the U.S. Department of Transportation through a competitive process in 2002 as a national "Center of Excellence." The Institute is funded by Congress through the United States Department of Transportation's Research and Innovative Technology Administration, the California Legislature through the Department of Transportation (Caltrans), and by private grants and donations.

The Institute receives oversight from an internationally respected Board of Trustees whose members represent all major surface transportation modes. MTI's focus on policy and management resulted from a Board assessment of the industry's unmet needs and led directly to the choice of the San José State University College of Business as the Institute's home. The Board provides policy direction, assists with needs assessment, and connects the Institute and its programs with the international transportation community.

MTI's transportation policy work is centered on three primary responsibilities:

Research

MTI works to provide policy-oriented research for all levels of government and the private sector to foster the development of optimum surface transportation systems. Research areas include: transportation security; planning and policy development; interrelationships among transportation, land use, and the environment; transportation finance; and collaborative labor-management relations. Certified Research Associates conduct the research. Certification requires an advanced degree, generally a Ph.D., a record of academic publications, and professional references. Research projects culminate in a peer-reviewed publication, available both in hardcopy and on TransWeb, the MTI website (<http://transweb.sjsu.edu>).

Education

The educational goal of the Institute is to provide graduate-level education to students seeking a career in the development and operation of surface transportation programs. MTI, through San José State University, offers an AACSB-accredited Master of Science in Transportation Management and a graduate Certificate in Transportation Management that serve to prepare the nation's transportation managers for the 21st century. The master's degree is the highest conferred by the California State University system. With the active assistance of the California

Department of Transportation, MTI delivers its classes over a state-of-the-art videoconference network throughout the state of California and via webcasting beyond, allowing working transportation professionals to pursue an advanced degree regardless of their location. To meet the needs of employers seeking a diverse workforce, MTI's education program promotes enrollment to under-represented groups.

Information and Technology Transfer

MTI promotes the availability of completed research to professional organizations and journals and works to integrate the research findings into the graduate education program. In addition to publishing the studies, the Institute also sponsors symposia to disseminate research results to transportation professionals and encourages Research Associates to present their findings at conferences. The World in Motion, MTI's quarterly newsletter, covers innovation in the Institute's research and education programs. MTI's extensive collection of transportation-related publications is integrated into San José State University's world-class Martin Luther King, Jr. Library.

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REPORT S-14-01

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Thank you to Caltrans Director Malcolm Dougherty; Caltrans Deputy Director Bijan Sartipi, District 4; Caltrans Chief of DRI Coco Breseno, Caltrans Associate Transportation Planner Christine Azevedo; American Public Transportation Association (APTA) CEO Bud Wright; American Association of State Highway and Transportation Officials (AASHTO) President and CEO Michael Melaniphy; United States Secretary of Transportation (ret.) Norman Y. Mineta, current Secretary of Transportation Anthony Foxx, and Acting Deputy Secretary of Transportation Victor M. Mendez.

Thank you to this year's participating schools, their teachers, and transportation agency sponsors for contributing to the education of tomorrow's transportation industry professionals: Cardozo Middle School, Washington DC, teachers Bamidele Jegede and Brian Johnson, sponsored by Mariah Stanley from the American Public Transportation Association; Findlay Middle School, North Las Vegas NV, teacher Dan Wheelock, sponsored by Dr. Harry Teng, University of Nevada Las Vegas; Toddy Thomas Middle School, Fortuna CA, teacher Crystal Fennell, sponsored by Matthew Philp of Caltrans District 1; Juan Crespi Middle School, El Sobrante CA, teacher Christian Sherrill, sponsored by Alfonso Miles of Caltrans District 4; and Morada Middle School, Stockton CA, teacher Tony Racco, sponsored by Maribel Ramirez Acevez of Caltrans District 10.

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Special thanks to the engineers from Caltrans, who mentored the students with their projects. They include Sheri Rodriguez and Christine Pepper from District 1; and Pat Roblado, Homer Zarzueza, and Irene Tu from District 10.

As always, MTI thanks the Honorable Norman Y. Mineta for his unwavering support for this event and for promoting the transportation industry as a viable future for young people.

For their work in producing this event and its report, thanks to the MTI staff, including Director of Communications and Tech Transfer Donna Maurillo, Student Assistant Donghoh Han, Research Support Manager Joseph Mercado, and Webmaster Frances Cherman. Transcription services were provided by Meg Dastrup of Word Power Plus.

Please note that all research for this symposium was performed by middle school students, and the Mineta Transportation Institute cannot verify the content accuracy of each group's presentation.

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FOREWORD

It is our pleasure to present this edited transcript from the Fourteenth Annual Garrett Morgan Sustainable Transportation Symposium, held March 27, 2014. This event is central to the Mineta Transportation Institute's goal to provide information and technology transfer. Middle school students are the target audience for this competition because they will become transportation's future leaders and innovators.

Transportation is a growth industry in both the public and private sectors. Our nation has a critical interest in improving and expanding public transportation, in repairing and improving its existing highway and rail systems, and in creating sustainable transportation. These needs will offer opportunities in all areas of transportation planning and management, from engineers and urban planners to policy managers and communications professionals.

Where will those talented professionals come from? No doubt, past and future participants in the Garrett Morgan Sustainable Transportation Symposium were provided a good start! Every year the projects are more original and visionary, and each year it is more difficult to select a winner. Students faced many challenges as they conceived and created their sustainable transportation entries for this competition. It compelled them to use many of the skills required of transportation professionals—math, physics, chemistry and other sciences, and of course, excellent communication and presentation skills.

MTI is happy to congratulate all students because they met a difficult challenge. MTI also extends its thanks to those individuals included in the acknowledgements section. Without each of them, this educational opportunity simply would not have happened.



Rod Diridon, Sr.
Executive Director
Mineta Transportation Institute

EXECUTIVE SUMMARY

On March 27, 2014, the Mineta Transportation Institute (MTI) continued its support of the United States Department of Transportation's Garrett A. Morgan Technology and Transportation Futures Program by conducting the Fourteenth Annual National Garrett Morgan Symposium and Videoconference on Sustainable Transportation. The purpose of this national videoconference is to stimulate young people's minds and encourage them to pursue the academic programs that will prepare them for professional careers in transportation engineering, planning, administration, and technology.

PURPOSE

The Garrett A. Morgan Technology and Transportation Futures Program was established in 1997 by former US Secretary of Transportation Rodney E. Slater. The program has three cornerstone components:

- To establish a partnership among the US Department of Transportation, state departments of transportation, public and private transportation providers and local communities to ensure that today's students are prepared to become the next generation of transportation leaders
- To develop a curriculum that can interest younger students in transportation and provide learning tools that can guide them to advanced academic and professional levels
- To provide the technologies that will enable students to develop skills that they can apply to future careers in transportation

PARTICIPATING SCHOOLS

This year's six videoconference schools included:

- Cardozo Middle School, Washington DC
- Findlay Middle School, North Las Vegas NV
- Juan Crespi Middle School, El Sobrante CA
- Morada Middle School, Stockton CA
- Toddy Thomas Middle School, Fortuna CA (two teams)

EVENT HIGHLIGHTS

The students were welcomed by MTI's Communications Director Donna Maurillo, American Association of State Highway and Transportation Officials Vice President Pamela Boswell, Caltrans Director Malcolm Dougherty, and Caltrans Chief of DRI Coco Breseno.

Retired Secretary of Transportation Norman Mineta introduced Acting Deputy Secretary of Transportation Victor M. Mendez, who addressed the students, acting on behalf of Secretary of Transportation Anthony Foxx. Each school was allowed to ask one question of Deputy Secretary Mendez, who engaged with the students and provided encouragement to complete their educations. Ms. Maurillo moderated the program.

She reminded the students that the day's activities are to encourage middle-school students to take technical classes in math and science in high school and direct their interests toward transportation. Then they can qualify for the technical courses in college that will then allow them to become transportation professionals, building US transportation systems in the future.

A lively question and answer period followed the presentations, with classes asking questions of each other. Extra points were awarded to schools for each answer that was managed well.

The winning team from Juan Crespi Middle School was announced a week later. Teacher Christian Sherrill, Caltrans District Four sponsor Alfonso Miles, a group of students, and parents traveled to San Jose CA in June to attend MTI's annual scholarship banquet and to accept the grand prize cash award and a plaque.

A biography of Garrett Augustus Morgan is included as Appendix A.

The videoconference, in its entirety, can be viewed at:

www.dot.ca.gov/research/planning/garrett_morgan_symposium/garrett_morgan_progam.htm

THE PROGRAM

OPENING REMARKS



Donna Maurillo
MTI, Director of Communications

Ms. Maurillo: Good morning, everybody! And good afternoon on the East Coast, because it's noon there! I'm Donna Maurillo. I'm communications director and director of technology transfer at the Mineta Transportation Institute at San José State University. We are broadcasting here from the California District 4 office in Oakland, California. And welcome to the Garrett Morgan Sustainable Transportation Competition.

I have a few things to say. This is our fourteenth annual competition for middle-school students. It helps students to gear up for possible careers in transportation, and to think about taking technology classes in high school, and in college.

There will be six teams competing today. The winning school will receive a plaque and \$500 for the classroom, plus an additional \$500 from one of our board members, Nuria Fernandez, who has donated \$500. So the winning team will have a total of \$1,000 for their classroom. The second-place winner will receive a plaque and \$300, and the third-place [winner] will receive a plaque and \$200, and the classroom can use that any way they wish. That's not for the school. That's for the classroom.

And the winning team also will send representatives to San José, California, on Saturday, June 21st, where they will attend our awards banquet and graduation ceremony, and they will receive their prizes there. Plane fare and hotel is all paid for at our expense. All the presenters will receive signed certificates, as well, and they will be signed by the secretary of transportation and other transportation leaders. So anybody who is presenting will receive one of those certificates, as well.

Okay. A little bit of housekeeping: Please keep your mic turned off if you are not actually presenting, because then, everybody else will be able to hear what you are saying, and there will be a lot of crosstalk. So please keep your mic turned off unless you are actually presenting.

And after Deputy Secretary Mendez makes his presentation, he may have time to go around to have each of the schools ask him one question. So please be prepared to ask a question. We'll go around to each of the schools, and that is if there is enough time to do that; so be prepared for that.

And I guess that's it. So we will start, and I will introduce right now Pamela Boswell, who is a vice president with the American Public Transportation Association, Washington, DC. She started out her career with the New York and New Jersey Port Authority, where she won awards for her work there. And then she went over to APTA, where she is the vice president there, and she will be representing the organization that is our official host today, and they also have a school that they are sponsoring. So it's my pleasure to introduce Pamela Boswell, vice president of APTA. Pamela?



Pamela Boswell
APTA, Vice President

Ms. Boswell: Thank you, Donna. I appreciate that wonderful introduction. Good afternoon! It's great to be here with all of you. We especially want to thank, on behalf of APTA, the Mineta Transportation Institute. You've hosted this event. We've been involved for the last 14 years, and it's always a pleasure.

I'm pleased to introduce *our* students today. They are our middle-school students from the TransTech [STEM] Academy of Cardozo High School here in Washington, DC. APTA is proud to sponsor our students, because they're part of the only transportation-related high school program, technology-wise, in the District of Columbia, so we're really proud of you.

You all represent the best of the next generation of leaders in the transportation industry. You have the talent and enthusiasm to advance public transportation. We always want to encourage you to pursue studies that focus on engineering, technology, and mathematics. It's very important. We have a variety of programs that build awareness, and advocate careers in transportation for young people. Next year, we have a youth summit that we've done for the last several years, where we bring junior- and senior-high-school students to Washington, DC, and we encourage you-all to participate in that program.

This year, May 16, we have our National Public Transportation Career Day, and that's an opportunity to expose you to the diverse job opportunities in the transportation industry. So we will make sure you all receive information about that.

Now I'm really pleased because I have the honor, once again – this is the second time – to introduce one of our leaders and legends in the transportation industry. For almost 30 years, Secretary Mineta represented San José, California, first as a city council member, as mayor, and then, from 1975 to 1995, as a member of Congress. Throughout this time, Secretary Mineta was an advocate of the burgeoning technology industry. He worked to encourage new industries and job growth, and he supported infrastructure development to accommodate the industry, and the tremendous growth.

Secretary Mineta served as the chairman of the House Transportation and Public Works Committee from 1992 to 1994, after having chaired the Subcommittees on Aviation and Surface Transportation. He was the primary author of the groundbreaking ISTEA legislation, the Intermodal Surface Transportation Efficiency Act of 1991. While in Congress, he co-founded the Congressional Asian-Pacific American Caucus, and was chair of the National Civil Aviation Review Commission in 1997.

In 2000, Secretary Mineta was appointed by President Bill Clinton as the United States Secretary of Commerce. From 2001 to 2006, Secretary Mineta served as Secretary of Transportation by President George W. Bush. Following the terrorist acts of September 11, 2001, Secretary Mineta guided the creation of the Transportation Safety Security Administration, an agency with more than 65,000 employees, the largest mobilization of a new federal agency in history. Since 2006, Secretary Mineta has been vice chairman of [Hill + Knowlton Strategies], based in Washington, DC, providing counsel and strategic advice to clients on a wide range of business and political issues.

He's been recognized for his leadership roles, with many awards. And I'm particularly pleased to note that, in 2006, Secretary Mineta received a lifetime achievement award from APTA, one of only three in APTA's over 100 years in existence. I am pleased to welcome Secretary Norman Mineta. (Applause.)



Norman Mineta
US DOT, Secretary of Transportation (ret.)

Secretary Mineta: Pamela, thank you very, very much. We're so proud here in Washington, DC, to have the folks here from Cardozo Middle School, and so it's really great to have you, and we'll hear your presentation.

Now I think all of you recognize how important transportation is. No matter what you do every day, somehow, transportation is involved. So it's something that all of us really sort of take for granted, until it's denied us, and then, when we don't have some transportation service available to us, we complain, and mutter under our breath about what's lacking.

So the fact that you're all interested about transportation, and studying what Pamela talked about in terms of the STEM programs – science, technology, engineering, and math – that, to me, is very important for your own future, as you consider transportation as a field to get into. So all of us recognize how important transportation is, and I hope that your interest in transportation not only here at Cardozo Middle School, but as you continue your educational progress, that that interest will remain with not only all of you, but with all the students from across the country.

Now, this morning, it's my pleasure to introduce our keynote speaker, the acting deputy secretary of transportation, Victor M. Mendez. As the acting deputy secretary of transportation, Victor Mendez holds the number-two position in the department, next to Secretary Anthony Fox. And prior to him becoming the acting deputy secretary of transportation, Victor was the head of the Federal Highway Administration; and there, he guided some 2,900 employees in the Federal Highway Administration, and, in that role, he directed President Obama's implementation of the American Recovery and Reinvestment Act of 2009, which made some close to \$27 billion available for bridge and highway projects across the country. So he helped revitalize the nation's infrastructure, especially in terms of creating jobs for more than 13,000 people across the country.

Deputy Secretary Mendez parlayed his lifelong interest in innovation and technology by launching the “Every Day Counts” initiative, which is focused on how the Federal Highway Administration can improve the administration and the environment through internal operations. This includes streamlining construction programs, and making them more cost-efficient.

Acting Deputy Secretary Victor Mendez also served on the Obama-Biden Presidential Transition team. And, before that, or at the time, he was director of the Arizona Department of Transportation, where he started in 1985. So he has held several positions which have furthered his career, and also with the professional organizations that support transportation. He earned his bachelor’s degree in civil engineering from the University of Texas at El Paso, and his MBA from Arizona State University. At this time, it really gives me a great deal of honor and privilege to introduce to all of you across the country, Acting Deputy Secretary Victor Mendez. Victor?



Victor Mendez
US DOT, Acting Deputy Secretary of Transportation

Acting Deputy Secretary Mendez: Thank you all very much, and good afternoon from the nation’s capital, and probably good morning for those of you out there in California. And Secretary Mineta, thank you very much for the introduction, and for all your service to America throughout the many years. I appreciate that.

It’s always really great to be here in the nation’s capital, especially with our young students. You-all are very enthusiastic about learning, and learning about transportation is, of course, very important to all of us at US DOT. So I do want to say congratulations to all of you for the terrific work you’re doing on your projects throughout the entire nation, and I really do hope it’s been a fun experience for you, a rewarding experience, that you’ve learned a lot. And something, hopefully, has sparked interest in transportation for all of you. We need a lot of great minds in transportation. We need young, energetic people like yourselves that can bring new ideas to the table. And also, of course, hope that it sparks an interest in a career in transportation for all of you.

I first became interested in transportation when I was in college, and, as Secretary Mineta mentioned, I graduated in civil engineering from the University of Texas at El Paso, UTEP for short; and, early on in my studies, I realized that transportation structures, bridges, especially, had a special interest for me. And so I took advanced classes in bridge and structural engineering, which really led more into my interest in transportation. So that's kind of how I actually started out focusing on transportation, and, you know, it's gotten me to where I am today. Transportation is, in fact, a very exciting area for all of us.

In fact, I don't know how you got here today, but you probably traveled some way, somehow, on the transportation system. And that's how I ended up here at US DOT, the US Department of Transportation.

As was mentioned, I've been here close to five years now, first as the administrator at the Federal Highway Administration, and now as the acting deputy secretary. It is a very exciting time to be here at DOT. We're working on a lot of very cool projects throughout the nation.

Keep in mind that this is the United States Department of Transportation. We have offices throughout the entire US – in fact, throughout the entire world, when you think about our aviation system, as well. We're building high-speed trains that can connect people, and travel over 200 miles per hour, and we have public-transit systems that connect people to schools and jobs.

We're helping develop cars that actually, in the future, will "talk" to each other, so that we can improve safety for all of us that drive around, for pedestrians, for bicyclists, and everybody else. And we have planes that can begin, now, "talking" to satellites as they're up in space. And we even have a robot, and we call it "RABIT" for short, and it's making sure that a lot of our bridges are in good and safe condition for all of you.

And so those are just a few of the things that we are doing at US DOT. Very exciting things. Things that really capture our imagination, and really [are] looking at the future; and we're counting on technology and innovation even more as we look toward the future. And that's where we need the young, creative thinkers like all of you to help us craft the future in transportation. And that's where all of you will come in. And so we're hoping very much that you get enthused with transportation. As I mentioned, we are very focused on using technology to help us solve some of our transportation challenges.

Now I know the idea of having a career for a lot of you, when you're in middle school, probably seems like a long ways off, and it probably is. But it's a good time for you to begin thinking about what do you want to do as you move into a career eventually, once you graduate from high school. You'll graduate from college. Hopefully, some of you will become PhDs and doctors in a science or an engineering field. That would be fabulous for all of us, but it's never too early to start thinking about those things, so we're hoping that all of you think about those issues when you're young, and remember, hopefully, that a lot of us are thinking about you as doctors and Ph.D.'s in math, sciences, and technology.

So, with that, I do want to encourage all of you to really focus on your work. Persevere. Work hard. Have fun in school. It's always good to have fun; but, at the same time, make sure that you graduate. That's very, very important for all of us. And if the work that we're doing at US DOT sounds challenging and exciting to all of you, we hope that you think about, at some point, being somebody like me! Being a high-level official. It's really fun! I have a great time talking to people.

I just came from a meeting with a group from Silicon Valley, high-tech people, in California. They're actually in a room right next door to us talking about transportation, so you get to talk to a lot of people with very fascinating ideas, and it's very interesting for me. And so, if I can do it, all of you throughout the nation can do it. So I encourage all of you to think about that.

So, again, I do want to say thanks to all of you for inviting me to be here with you, and, hopefully, sometime in the future, you might even be working for US DOT. So, with that, I do want to say good luck to all of you in your future studies. I hope you have had fun doing what you're doing. And, with that, I will take a few questions, I believe. There's time for questions. Is that correct?

Q & A FOR DEPUTY SECRETARY MENDEZ

Ms. Maurillo: Thank you.

Sec. Mendez: Does anyone have any questions?

Ms. Maurillo: Thank you, Mr. Deputy Secretary. Cardozo Middle School in Washington, DC, do you have a question for the assistant secretary?

Cardozo male student: Yes. Yes, we do. What source of energy do you prefer to be transported by, yourself? Like what form of energy?

Sec. Mendez: By the way, I like your tie, you know. That's a fabulous tie. I love it.

Cardozo male student: Thank you.

Sec. Mendez: Very sharp. Sharp-dressed young man! In terms of fuel, I do drive a car.

Cardozo male student: My mom does, too.

Sec. Mendez: Okay. Everybody seems to drive a car; but let me talk about the efforts that are under way throughout the nation in terms of alternative fuels.

Cardozo male student: Okay.

Sec. Mendez: There is a lot of research under way in various fields of alternative fuels that actually will fuel not just our motor vehicles, or our cars, that most of us drive, but also looking at motor carriers. Looking at, for example, LNG, liquefied natural gas, and so there's a lot of research.

I can't tell you that I have a specific favorite. You know, I use what I use because I *have* to. But I also would encourage all of you, as you look at, into the future, that, when you undertake your studies, those are research areas that, in the energy arena, we all, as a nation, have to be looking at. There are other sources of fuels, and there may be some sources that maybe we haven't even thought of, and that's where a lot of you, as you look toward the future, in your studies, [could] be thinking about what other sources of energy might there be.

Cardozo male student: Well, our source of energy is going to be a big surprise for everyone!

Sec. Mendez: Very good! Are you thinking about some of that?

Cardozo male student: Yes.

Sec. Mendez: All right!

Ms. Maurillo: All right, Deputy Secretary. Findlay Middle School in North Las Vegas, Nevada, do you have a question for the deputy secretary?

Findlay male student: Yes, we do. Yes.

Ms. Maurillo: Go ahead, please.

Findlay male student: Mr. Secretary, in your opinion, are we moving fast enough towards sustainable transportation?

Sec. Mendez: If I captured that right, are we moving fast enough toward a sustainable transportation approach. Is that correct?

Findlay male student: Yes

Sec. Mendez: Okay. Well, I would say we can do better. There's always room for improvement. I can tell you, we've made a lot of strides in the last decade. I think more and more people are beginning to look at different ways of moving throughout our transportation system. I would say, in the last decade, our ridership, for example, in public transportation, has increased dramatically. And so we're looking at better ways to create sustainable communities, with sustainable transportation systems; but, to answer your question, I think we can do better, and we are doing better, but there's always room for improvement.

Findlay male student: Thank you.

Sec. Mendez: Thank you!

Ms. Maurillo: The next school, Toddy Thomas Middle School in Fortuna, California, do you have a question for the deputy secretary?

Toddy Thomas First Team male student: Yes. Mr. Secretary, if our concept wins, would you be interested in funding it?

Sec. Mendez: Well, we can talk about that. First step is, you've got to win first, though, and then we'll talk. How's that?

Toddy Thomas First Team male student: That's fine! (Laughter.)

Sec. Mendez: Let me just say. We do have, at US DOT, several programs to help support students in universities, and I believe there may be a program for high school students, to actually help you continue with some of the research projects that you're undertaking. So there's always a possibility.

Toddy Thomas First Team: Thank you.

Sec. Mendez: Okay. Thank you.

Ms. Maurillo: There's a Second Team in Toddy Thomas Middle School. Does the Second Team have a question?

Toddy Thomas Second Team: Yes.

Woman's voice: Go ahead. You'll talk from here?

Toddy Thomas Second Team: Yes.

Man's voice: Just talk right there.

Toddy Thomas First Team male student: What would you say is your favorite part of your job?

Sec. Mendez: You know, my favorite part of my job is actually being able to talk to people from all parts of the country. In fact, we do have quite a few programs where we coordinate with other countries throughout the world, and it's just being able to have that discussion with various people, and understanding what their challenges are, what their good ideas are that maybe we can incorporate in the United States; so just being able to talk to people on a day-in and day-out basis, and capture their ideas.

One of the things that's very, very important for me, professionally *and* personally, is the concept of innovation, bringing in new ideas to help us, not just in transportation, but, I would say, in any facet of our world, to make our world better. And that, to me, is what I find very exciting, day-in and day-out, just capturing the new ideas that maybe I've never heard about, like our students here, that just mentioned the energy question.

I'm very curious to see, you know, what are you, as young citizens out there in the nation, what are you thinking about in the future in terms of energy? In terms of sustainable transportation, as was just asked about? Whatever project you're working on, those are ideas that, to me, are very fascinating and make my job a lot of fun.

Toddy Thomas First Team female student: Thank you.

Sec. Mendez: Thanks for the question. Thank you.

Ms. Maurillo: Thank you, Mr. Deputy Secretary. We have two more schools here. Juan Crespi Middle School in El Sobrante, California, do you have a question for the deputy secretary?

Juan Crespi male student: I was wondering — it's similar to the first question from Toddy Thomas. I was wondering if a government program would be willing to fund a ride-share program.

Sec. Mendez: Can you repeat that a little louder? I'm not sure I captured it all.

Juan Crespi male student: Would a government program be willing to fund a ride-share program for their project?

Sec. Mendez: We do have some research funding, and these are competitive-type programs, where you actually have to submit an application. And I think, in the past, we *have* funded some ride-share programs that bring to the table new ideas. You know, if you were to come in with something that's different, that will really help advance, for example, in your case, a ride-share concept. And those are the things we're looking for in our research arena.

Juan Crespi male student: Thanks.

Ms. Maurillo: Thank you very much. And we have one more school, Morada Middle School, sponsored by Caltrans District 10, from Stockton, California. Do you have a question?

Morada male student: Yes, we do. At the present time, what would you say is the greatest challenge to the transportation industry in the United States?

Sec. Mendez: Well, there isn't one challenge in particular. I think it's really a complex question that has several answers to that. I think what one of our bigger challenges is, of course, as a nation, being able to invest in our transportation system, and keeping in mind that transportation really is about many modes of transportation.

You have public transportation. For example, a lot of us have light-rail systems and bus systems in place throughout the nation. We also have high-speed rail that's very, very important to us as an administration.

We have our aviation system. We want to make sure that system can actually grow as we move into the future, and be safe, as well.

And then, of course, we have a lot of freight. The country *is* growing. The economy is growing. We want the economy to grow better, and faster, but we are going to have a lot of freight, and so we need to be able to address those issues, as well.

And then, of course, all of us, at some point in time, we do recreate, and so it's important for us to have a safe system. For those of us that are ordinary citizens, that are driving to work, to jobs, to school, it's important for us to make sure that *that* system is also operational, and that it's efficient. So it's a very complex question that you're asking, and I would ask you to think about it, really, in terms of all the modes of transportation, and the challenges that we face, that we need to really be able to address as we move into the 21st century.

Morada male student: Thank you.

Sec. Mendez: Thank you!

Ms. Maurillo: All right. Thank you very much, Mr. Deputy Secretary, and it was a pleasure to have you with us. You're welcome to stay throughout the competition if you wish, but we realize that you and Secretary Mineta have busy schedules; so, if you must leave, let me say it was a pleasure to have you with us, and thank you to all the students for having such wonderful questions. Thank you very much!

Sec. Mendez: Thank you all very much, and good luck in your careers. Good-bye. (Applause.)

MALCOLM DOUGHERTY COMMENTS



Malcolm Dougherty
Caltrans, Director

Ms. Maurillo: Thank you so much! Now we will hear from Malcolm Dougherty, who is the Caltrans director. He runs the entire program, all the Caltrans Department of Transportation. And he is in charge of all the highways in California, which is a huge responsibility, and thousands of employees, as well. Mr. Dougherty is coming to us from Sacramento, California. Mr. Dougherty, please take it away!

Mr. Dougherty: Thank you, Donna! And also thank you to Mineta Transportation Institute for everything that you do, as well as putting on the Garrett Morgan Symposium. And I was impressed to hear earlier that it's the 14th year that you've been able to do that.

So, first, congratulations to all the students for your participation in the program; and, in a moment, I'll reintroduce you, as well as acknowledge your teachers for their hard work, as well as the sponsors of each group.

I also want to express my appreciation. I hope all the students enjoyed the discussion from Acting Deputy Secretary Mendez and former Secretary Mineta because we always, as transportation professionals, enjoy the opportunity to hear from them, as well, and it was good to see them earlier.

Let me first talk just a moment about transportation from a state perspective, and, more specifically, sustainable transportation. I work for Caltrans, which is the department of transportation for the State of California. Each state has its own department of transportation, and then, obviously, we work very closely with the US Department of Transportation, US DOT, which Secretary Mineta and Deputy Secretary Mendez work for.

So we're responsible, along with US DOT, and all the cities and counties, for providing a well-integrated transportation system that's going to really help us get around as travelers that Victor Mendez mentioned, as well as get goods to where they need to be for us to purchase them, whether or not it's food, whether or not it's a TV. Whatever it is, the well-integrated transportation system needs to really help us get where we want to go, to work, to school, etc., as well as get those goods to market. And between the state DOTs, the US DOT, and cities and counties, we try to accomplish that as best we can.

So transportation, you can see, is a very vital component of our lives, whether it's the economy, whether it's our convenience and quality of life; but it's also critical for the transportation system to really fit in with the environment, as well — either improve the environment, or at least not do harm to the environment, while the transportation system is being used, and I think you've probably learned some of those things while you were doing your projects.

It takes all sorts of professionals to work in transportation, and I think Deputy Secretary Mendez mentioned this. I'm also an engineer, but we also have project managers. We have people who are specialized in environmental fields such as biology. We have right-of-way experts. We have financial experts, etc. So there are lots of opportunities for different [fields of] expertise to work in the field of transportation.

And, in the future, you've heard some of the things that were talked about. We'll have driverless cars. We'll have different ways to get around, such as high-speed rail. Also more opportunities for bikes and alternative transportation modes. And I think we'll have different ways to power those different transportation modes.

So I'm looking forward to hearing what all of you kids have come up with, with your projects. I know that you'll exemplify some great intelligence at your age. And, after taking part in this program, maybe you'll think about transportation as a career path, as was mentioned before.

I'd like to take this opportunity to re-introduce each of the schools, as well as introduce the teachers and the mentors, because they've played a big part in making all this happen.

INTRODUCTION OF COMPETING SCHOOLS

Mr. Dougherty: I will start with Cardozo Middle School, or Cardozo High School, in Washington, DC, and we heard from their sponsor, Mariah Stanley, from the American Public Transportation Association, so thank you for your sponsorship. Their teachers are Brian Johnson and Bamidele Jegede. So if we could at least have Cardozo High School wave and acknowledge themselves — and welcome, and good luck in today's presentation — I'd appreciate it!

The next school that I'd like to introduce is the school from Las Vegas, and we heard from them just a minute ago, Findlay Middle School, and their teacher is Dan Wheelock, and they're sponsored by the University of Nevada Las Vegas, specifically Dr. Harry Teng, the assistant professor of civil and environmental engineering. So I thank their teacher. I thank their sponsor, and I acknowledge that school, and welcome to the competition, and good luck to you, as well, Findlay Middle School!

We have several schools from California, and they're sponsored by the various Caltrans districts in the state. I believe there are two teams, seventh and eighth graders, from Toddy Thomas Middle School in Fortuna. Their teacher is Crystal Fennell, and their Caltrans engineering mentors are Sherry Rodriguez and Christine (inaudible), and they are sponsored by Matthew Philp from our Caltrans District 1, which is on the north coast of California, so welcome to each of you. Good luck! And thank you for your participation and your sponsorship and your leadership from the teachers. If we could acknowledge the two teams from Fortuna, California. (Applause.)

And then we also have, from El Sobrante, California, Juan Crespi Middle School, eighth-graders. Their teacher is Christian Sherrill, and their Caltrans mentors are Brian Rolley and Dina L. Neckall, and they are sponsored by Alfonso [Miles], and that's from Caltrans District 4, which is the San Francisco Bay Area, and welcome to each of you, and thank you to *your* teachers and sponsors for your participation, and good luck today in *your* presentations. (Applause.)

And then, finally, we have Morada Middle School, which are eighth-graders from Stockton, California, and their teacher is Tony Racco, and their Caltrans [mentors are] Pat Roblado, and Homer Zarzueza, and Irene Tu, and they are sponsored by Maribel Ramirez Acevez, also from Caltrans District 10, which is in the northern-central part of California, in the Stockton area, so welcome to you, and thank you to your teachers and sponsors, and good luck in your presentations, as well. (Applause.)

So, with that, Donna, thank you very much for the invitation. I look forward to participating and listening to the presentations on this every year, and congratulations on another successful program.

Ms. Maurillo: Thank you, Malcolm! It's always a pleasure to have you with us, and thank you, especially, to Caltrans for being in charge of this broadcast!

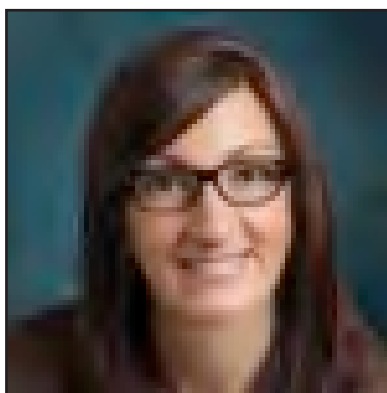
Now we will go around and this is the part of the program where we will have the competition, the presentations, and here is how the process will work.

First, each team will make a presentation, and it will be no longer than 10 minutes, and we will ask, then, each of the other schools if they have a question for that team. So, while the presentation is happening, please, all the other schools, take notes so that you will have an intelligent question to ask, and then you win extra points for being able to ask a good question, and then the responding team gets extra points for their ability to answer it well.

Then the students will start in random order; and, if a school has two teams, they will not appear in consecutive order. That will allow the second team a chance to get set up so that they can make their presentation, as well. Thank you very much.

So we will start with the first team, and that will be Caltrans District 1, Toddy Thomas Middle School, and let me give you their order first. We will have Caltrans District One. Then we will go to Caltrans District 4, Juan Crespi Middle School. Then we will do US DOT in Washington, DC, Cardozo Middle School, sponsored by APTA. And then we will go to Caltrans District 10, Morada Middle School, from Stockton. And then Las Vegas, the University of Nevada, Findlay Middle School, North Las Vegas. And then, finally, with Caltrans District 1, their second team, Toddy Thomas Middle School, from Fortuna, California. Okay?

Is that Coco I see on the screen? Oh, Coco, do you have a few words that you'd like to say?



Coco Briseno
Caltrans, Chief of DRI

Ms. Briseno: I would just like to welcome everyone, and congratulate everyone for all their hard work, and I look forward to the presentations. So thank you!

Ms. Maurillo: Thank you very much, Coco. Okay. Toddy Thomas Middle School, Fortuna, California, Caltrans District 1 will make its presentation now.

THE COMPETITION

TODDY THOMAS MIDDLE SCHOOL FIRST TEAM



Solar Electric Car

Male student: “Sustainable Transportation,” by Scott and JV.

Male student: Our objective is to create a sustainable vehicle that doesn’t use fossil fuels, making the Earth cleaner.

Male student: Our concept is to build an electric car that you don’t have to charge, making it a more desirable option for people to use.

Male student: How it works. It is an electric car. It has a solar panel on top of the car to get the car going. Once the car gets going, the gyroscopes will spin, creating electricity to keep the battery charged, making it so the car does not have to get charged.

Male student: Gas to electric. To convert your car, with all the modifications, it will cost less than \$7,000. It will cost \$6,000 to convert your car to electric, and about \$1,000 for the gyroscopes and solar panels.

Male student: Adhesive solar panel. The solar panel is going to be on top of the car. It will make energy to start the car, and get it going.

Male student: This is a picture of a gyroscope. A gyroscope is an object that spins extremely fast from little movement.

Male student: The cost of the car conversion is about \$7,000, and for the gyroscope and solar panels, it is about \$1,000. The yearly fuel savings per car is \$1,100, and it pays for itself in just less than seven years.

Male student: Recap. The electric car. We're building an electric car that does not have to be charged. It has a reasonable price range, and it has no fossil fuels.

Chorus: Thank you. (Applause.)

Q&A FOR TODDY THOMAS MIDDLE SCHOOL FIRST TEAM

Ms. Maurillo: We'll go around and ask each of the teams if they have a question for you. So, Caltrans District 4 school, Juan Crespi Middle School, do you have a question for them?

Juan Crespi female student: Yes, I do. This is a quick question. Actually, I've heard that you said that you would use solar panels, and solar panels have this life cell, basically, that only lasts up to 30 years. And you said it would cost less than 10 years. So would people have to — after the 30 years, would they have to get another solar panel, so then the electric charge won't have to, basically, like — You said the battery didn't have to charge, but if you need to change the cell, then what would you do there?

Toddy Thomas First Team male student: I'd say that you would most likely have to buy a new solar panel. We did not add that to the price range, but that is very good.

Ms. Maurillo: Thank you. Cardozo Middle School, do you have a question for Toddy Thomas?

Cardozo male student: Yes, we do. My question is, what would you — How long, how much heat can the solar panels withstand if they're going to be on top of a car? Say it's a very hot day, and the top of the car is getting very hot. Would the solar panels have like a built-in cooling system or something?

Toddy Thomas First Team male student: It doesn't matter, for a solar panel, how hot it will get, so a hot day wouldn't affect it.

Toddy Thomas First Team male student: Because there are already solar panels on top of cars, so we just added things to them.

Ms. Maurillo: Thank you very much. Morada Middle School, from Stockton, California, do you have a question for Toddy Thomas?

Morada female student: Yes, we do. What happens if it's a cloudy day, or it's raining, and the connection from the sun to the solar panels gets weaker from the clouds?

Toddy Thomas First Team male student: The solar panels will store energy so, once you get the car going, you don't need the solar panels any more.

Toddy Thomas First Team male student: And they will still charge in cloudy or rainy conditions.

Ms. Maurillo: Thank you very much. Findlay Middle School, in North Las Vegas, do you have a question for Toddy Thomas?

Findlay male student: Yes, ma'am. What type of storage panel would you use? Would you use photovoltaic, or something else?

Ms. Maurillo: Can you speak louder, please?

Toddy Thomas First Team male student: Can you repeat that, please?

Findlay male student: What type of solar panel would you use? Photovoltaic or something else?

Ms. Maurillo: Did you hear that?

Toddy Thomas First Team male student: Not too well. (Discussion with advice ensues.)

Findlay male student: What type of solar panel would you use? Photovoltaic or something else?

Toddy Thomas First Team male student: Photovoltaic. Because it will stick to the car.

Ms. Maurillo: Is that it? Okay. Toddy Thomas Middle School, Second Team, do you have a question for the First Team?

Toddy Thomas Second Team male student: Yes, we do. If it were a bigger car, how much would it cost to convert it than a smaller car?

Toddy Thomas First Team male student: We wouldn't convert a bigger car. It would be about the size of a regular car.

Toddy Thomas First Team male student: So, in other words, the car is just going to be like electric cars that you see today.

Ms. Maurillo: Thank you very much. Those are all the questions? Okay, thank you very much. (Applause.) Our second presentation will come from Juan Crespi Middle School, from El Sobrante, California. They are sponsored by Caltrans District 4. Go ahead.

JUAN CRESPI MIDDLE SCHOOL*Changing Travel Behavior through Ride Sharing*

Richard Lira Gonzales, Jr.: Good day, ladies and gentlemen. I am Richard Lira Gonzales, Jr., and we are here in District 4, Caltrans, and we are StarTrans, Incorporated. I would like to introduce my team: Kevin Cassman, my co-CEO; Mercy Retana, our chief data officer; Kanani Bowie, another of our chief data officers; Jill Rossing, our app creator; and Jasper Sun, one of our devil's advocates. Thank you.

Female student: Evolve or Become Extinct. Today's on-road vehicles in the United States produce over a third of the carbon monoxide and nitrogen oxides in our atmosphere, along with 20 percent of global-warming pollution. So we know, if we don't evolve with a better energy source, we will either have to die out or evolve.

And we are StarTrans, Incorporated, "Making way for a cleaner future."

You may be wondering who are we. Well, we are a group of seventh- and eighth-graders from Juan Crespi Middle School, and we have a mission to reduce fossil-fuel use and congestion through technology to make sharing rides easier, safer, and more efficient.

Female student: Why change commuter behavior? Well, for one, fossil fuel will be reduced, and it would actually help the environment a lot more because then we don't have to go under water to go look for them, or in cave-ins. And, most importantly, there won't be any chemical release or underground explosives that actually ruin a lot of plant life.

Secondly, congestion will be reduced, and it helps many people get to work earlier. I believe that many adults here would rather get 25 miles in ten minutes than have to wait three hours just to go that far, because traffic is up, and they don't really have a car pool.

Lastly, it will also reduce greenhouse-gas emissions. Greenhouse gases expect (sic) a lot in global warming, and it also affects plant growth and nutrition levels. I'm pretty sure we all want to guard against all these.

Gasoline is also projected to last only 35 to 70 years, at best. Gasoline: By the year 2020, gasoline will probably reach \$8 per gallon.

This is actually pretty interesting. Americans spent 4.8 billion hours stuck in traffic, and wasted 1.9 billion gallons of gasoline in 2011, due to traffic congestion alone, basically.

This is actually very important. By 2050, carbon-dioxide emissions from, basically, everyday stuff in the US may reach more than 8 billion metric tons. You might be wondering, what are metric tons?

Well, we did the math, and it turns out that 176 trillion pounds of carbon dioxide will be released into the air in 2050.

Male student: The StarTrans app. Our app is a safe and efficient way of finding a ride to work. You can apply with a computer, an 800 number, or you can send in an application, whichever one is the most convenient for you.

How it works. With the ride-share app, all you need to tell us is where you are, where you're going, what day or days do you have to be there, and by what time do you have to be at your destination. That's all. There will be background checks, you know, for safety reasons, and to make sure everything runs smoothly. And then, once you're cleared, we give you a — If you have a smart phone, we give you an account, so you could use StarTrans.

Or, if you don't, because not everybody has a smart phone, we'll give you a GPS tracking card so you can use that, with your name and picture on it. And don't worry about arranging. I mean we worry about arranging all the rides. We arrange all the rides, and then drivers and passengers will be notified though email, text messages, and callbacks.

Male student: Nuts and Bolts. Participants will rendezvous at a pickup point, right, so when the car gets there, if you have a tracking card, you just swipe your card, and then that tells StarTrans that you started ride-share, that you started your ride already. And, when you get out of the car, you swipe it again, so we know that you ended your ride. And when you get to your place of employment, you swipe it one more time, so we can confirm with your employer that you used ride-share and came to work. And then, when you need to go back home, the reverse happens. So first, you swipe at your business; then, when you get in the car, and then once you get out of the car, on your way home.

After you're done with your trip, StarTrans has a computer base that records all of this, so that the government can give you tax incentives and take accountability. And, by the way, when I said, "swipe your card," if you have a smart phone, you could just scan that instead, and it's the same result. It's the same thing.

StarTrans Accountability Factor. For drivers, passengers, and businesses that do ride-share through StarTrans, they will get tax incentives. Individual participants will receive funds for using the StarTrans app, and we'll be using state and federal grants, a possible gasoline tax, and private donations to fund the incentives.

Male student: Benefits and incentives. Ride-share is not only efficient, it is also cost effective. According to the Texas Transportation Institute, the average commuter in the United States spends over 34 hours, and \$713, annually due to congestion in our roads. Also, pretax benefits such as those found under IRS Code 132(f), say that employers may provide up to \$245 from employee paychecks to ride-share programs, and this reduces taxable income.

As for fuel use, if the average commuter uses ride-share just once a week, the fuel savings could be in the billions.

Success for StarTrans. And, as I [said] before, there's tons of financial benefits, such as \$1.3 billion in savings, and if every driver just carpooled one day a week, rather than driving, we would save up to \$5.46 billion of gasoline in one year.

Male student: Most importantly, carpooling will help save our planet. And this is the most important part of our presentation, is that car-pooling will help save our planet. With this self-explanatory picture right here, it shows that all these are the polar icecaps, and, on the left, it's how it was in the 1950s; and this is how it was, is going to be, in the 2000s, 2050s. And we are losing more and more polar ice caps due to pollution in the air; but, if we manage to get rid of the gasoline usage, then our polar ice caps might be able to come back.

Female student: What kind of future do you want to see? Transportation has historically been a technology-intensive industry. The invention of fast-moving rail engines forever changed the pattern of human settlements, with cities expanding beyond previous limits, and the activities of trade and commerce also flourishing. We here at Caltrans have an app that focuses on significantly lowering pollution, congestion, and the costs, in the long run.

How will we be able to use transportation if gasoline is absolutely used up? Roughly half of all energy used in California is used by the car-transportation use, more than 18 billion [gallons] of gasoline and diesel fuel a year. That's enough to drive a car 30 miles per gallon to make more than 2,900 round trips to the sun and back. If people continue to choose to use cars that use gasoline at a constant rate, meaning to use them for short-distance use, and for the need of one person only, then gasoline will no longer be an option for transportation.

Male student: StarTrans, Incorporated.

Chorus: Ride with the stars!

Male student: Next slide, please. (Applause.) Once again, these are all of our helpers, and everyone who helped, worked with us, to do this project. Me, Richard Lira; Kevin Cassman; Mercy Retana; and Kanani Bowie.

And then, back here, there are our other helpers: Mylani Sonico, Jelaine Maestas, which are our designers for our posters, and our business cards. There is also Arjen Manalang and Dilraj Singh, who helped create the app; and Fernando Mayorga and Jasper Sun, who helped do the slides, and are our devil's advocates; and Kyla McKinney and Ismael Gutierrez, our researchers for this project.

I'd also like to thank the teachers that helped us — Mr. Sherrill and Miss Nguyen. And though they can't be here, Miss Pavlich and Miss Johnson. And also, I would like to say that Mr. Mause, Mr. Rowley, and Miss Dina did a great job in helping us in our project. Thank you very much! (Applause.)

Q&A FOR JUAN CRESPI MIDDLE SCHOOL

Ms. Maurillo: Now we'll do questions. First question will come from Cardozo Middle School in Washington, DC. Do you have a question for this team, please?

Cardozo male student: We do. For your app, can you come pick up someone from anywhere, or just at specific stops, or something?

Juan Crespi male student: Well, you see, you tell us where you are, and we'll — Like this isn't a taxi service. This is somebody on their way to work. So we'll tell you like where it's convenient for both you and the driver. Then, that's where you guys will meet up, and that's when you'll go to work, and go through the swiping process.

Ms. Maurillo: Okay, thank you very much. Morada Middle School, from Stockton, California, at District 10, do you have a question for this team, please?

Morada female student: Yes, we do. [Even if] 100 percent of people are using the service, won't we still be at congestion and gridlock on the roads?

Juan Crespi female student: Although there actually will be less congestion, because, basically, right now, we're only at 20 percent congestion now, and only 10 percent of the US is carpooling. But imagine if there was 50 percent of the US carpooling. There won't be as much congestion, and you can go quicker and easier; and, literally, there really isn't that much to wait. Now it's terrible, and if it was 50 percent, we would be going to our work time, on time, and we wouldn't be late, and we wouldn't have to complain to our bosses why, and that it was the fault of congestion.

Ms. Maurillo: All right. Thank you very much. Let's see. Next is Findlay Middle School, North Las Vegas. Do you have a question for this team, please?

Findlay male student: Yes. You mentioned that it took three hours to charge the car, but are you aware of the nationwide system of Tesla superchargers that charges 200 miles in 30 minutes?

Juan Crespi male student: We're actually not doing the program based on car charge. What you heard mentioned was, people can sometimes spend up to three hours — kind

of exaggerated — in traffic, due to congestion on our roads, and we'd like to reduce this, using our ride-share program.

Ms. Maurillo: Thank you very much. Next question comes from Toddy Thomas School, Second Team, from Fortuna, California. Do you have a question, please?

Toddy Thomas Second Team female student: How do you determine the driver?

Juan Crespi male student: Well, you see, there's a screening process to it, so we do a background check, and then they must have insurance. They must have like an appropriate insurance, right? They must have the right insurance. And then, after that, after we check that they're all cleared as a good driver, then we give them their transponder, so they could start driving. Because, remember, this isn't a taxi service. This is a ride-share program, so that's when it starts.

Ms. Maurillo: And then, finally, the First Team from Toddy Thomas Middle School of Fortuna, California, do you have a question for this team?

Toddy Thomas First Team male student: Yes. So can anyone with a good insurance policy be a driver?

Juan Crespi male student: Well, not everyone with a good insurance policy. They also have to have a valid license, and we also do background checks, and they have to fill out surveys, and we must be completely sure that this driver is completely safe, and won't do anything that we wouldn't expect a driver to do.

Ms. Maurillo: Thank you very much. That concludes the questions for this team. (Applause.) Next up, we have a presentation from Cardozo Middle School from Washington, DC, and they are at the US Department of Transportation office. Cardozo, you may start your presentation.

Ms. Briseno: Hey, Donna, this is Coco. We don't see the Washington, DC, link on our screen here, so we're not sure if they got dropped off. We're trying to find out. Do you see them on yours?

Ms. Maurillo: No. I do not. What we will do then is we will skip over to Morada Middle School, and then we will come back to Cardozo as soon as we can get a link up from them, okay? District 10, Morada Middle School, you're on, and I hope you're ready to do that. Do you need another couple of minutes to prepare, or are you ready to start?

MORADA MIDDLE SCHOOL*Sustainable Water Car System*

Alyssa McCord: Hello, and good morning, everyone. Our team is proud to introduce the sustainable water car system for the 21st century. This project was sponsored by CalTrans District 10.

Our team is very pleased to have this opportunity to present our idea, the Aquamobile, to help the environment. We hope this will (audio cuts out) in good condition. Now we introduce ourselves. I am Alyssa McCord, and I'm the production manager.

Alexandria Lewis: I'm Alexandria Lewis, and I am the transportation manager.

Val Yu: I am Val Yu, and I'm the electrical engineer.

Kiley Tate: Good morning. My name is Kiley Tate, and I'm the marketing manager.

Christina Stringer: I am Christina Stringer, and I am the budget manager.

Angelina Koss: And I am Angelina Koss. I'm the project manager. Our production manager, Alyssa, will be the first to lead us in our discussion.

Alyssa McCord: Thank you, Angelina! By now, you might have noticed the many environmental and economical issues related to transportation — issues such as global warming and unusual climate changes, to name a few. Examining these issues thoroughly is a very important part of finding the solutions to these problems. Many researchers have learned that Earth will eventually run out of fossil fuels. In other words, we will run out of gas sometime in the future, so we will need to develop and rely on a fuel alternative before this happens.

Our transportation system also needs to be more efficient so that people can go from Point A to Point B in a safer, faster, and more-reliable way. Now, our transportation engineer, Alexandria, will discuss the goals and objectives for this project.

Alexandria Lewis: Thank you, Alyssa. These are the three goals for our proejct that would help sustainable transportation. Our first [goal is to reduce the amount of pollution and smog in the air because that causes global warming. And in order to do that, we need to create a system that would cause little to no negative impacts to our environment, which is our second goal. Lastly, we want to create a system that will only run on renewal resources in order to replace the use of fossil fuels. Next, our electric engineer, Val, will discuss the environmental impacts of our project.

Val Yu: Thank you, Alexandria. Our system has several positive environmental impacts. Our source of energy, water, is safer than fossil fuels. Fossil fuels also create gas, which is highly flammable, but water is not. Water is also very easy to obtain because most of the earth is covered with water. Also, while fossil fuels are responsible for much of the pollution around the world, water generally produces no pollution. Next, our marketing manager, Kiley, and our budgeting manager, Christina, will discuss the marketing-related issues regarding our project.

Kiley Tate: Thank you, Val. As you may know, gas prices are getting higher and higer; but, with our system, you won't ever need gas. Water is much more available than gas and is less expensive than gas. So the cost of operating our project will save you a lot of money over the life of the project compared to the cost of operating a gas-powered vehicle. At the present time, many companies and universities are working on batteries that will greatly increase the range of electric cars. The technology, combined with our water engine, will replace the need to have a backup gas-powered engine.

Christina Stringer: Our project can undoubtedly be used in other countries around the world, since water is available in many parts outside the United States. As a result, our project can be used to promote sustainable transportation around the world. Decreasing the use of fossil fuels on a worldwide level means that the environment will only improve over time. Now I will turn it back to Alexandria to show you how our project works.

Female student: Thank you, Christina. This is how our project works. Our drawing is not very detailed, but it has the main components of our water engine. Water is pumped past the three turbines, which causes them to spin at a high rate, and each turns an alternator. There are three alternators. The three alternators produce electricity, which is stored in the battery. The car does not have to be moving. The pump will automatically switch on when the battery needs to be recharged. (Audio cuts out.)...located near the top would be where that would happen. The system is pollution-free, and does [not] require any outside source of energy. This is how our project works. Now, back to our Angelina, to finish our presentation.

Female student: Thank you for listening to our presentation. We hope that our project will help (inaudible), and, in turn, improve the quality of life on earth, not just for people, but also for the animals and other living things that are part of the very same environment we all live in. Are there any questions?

Q&A FOR MORADA MIDDLE SCHOOL

Ms. Maurillo: First, we will go to Findlay Middle School, from North Las Vegas, Nevada. Do you have a question for this team, please?

Findlay male student: Yes. You guys talked about all the water being in like the world, how it covers most of the world. Are you guys going to use the water, salt water, or are you guys going to de-salt [it]?

Morada female student: You can use any type of water; but, if you use ocean water, which has salt in it, you're going to need a desalination process.

Findlay male student: Thank you.

Ms. Maurillo: Thank you. I would like to please ask the technician in District 10 to please remove the PowerPoint from the screen so that we can see the other presentations. Thank you.

Next question will come from Toddy Thomas Middle School, Fortuna, California, their Second Team, please. Do you have a question for this team?

Toddy Thomas Second Team female student: How will the water get from the ocean or river to the car?

Morada female student: You'd just use a buck to fill up the tank.

Morada female student: It's a lot like when you fill up your car at a gas station. It's the same idea to how you would fill it with water, as you would fill it with gas.

Morada female student: It's basically a hose.

[Laughter]

Ms. Maurillo: Professional demeanor, please. The next question will come from Toddy Thomas Middle School, Fortuna, California, First Team.

Toddy Thomas First Team male student: Where does the water go, once it goes through the system?

Morada female student: Well, it goes continuously, so it won't leave the system. It will stay there, so we don't have to always take more water, so it will stay more sustainable.

Ms. Maurillo: Next question is from Juan Crespi Middle School, El Sobrante, California. Do you have a question for this team?

Juan Crespi male student: Yes, we do. Wouldn't all the condensation that goes into the air cause the planet to increase in temperature, and make the air a lot more dense?

Morada female student: No. It is a closed tank, so no evaporation will happen.

Morada female student: So then no water will leave the tank, and no water will enter the tank. It will stay in like the same?

Morada female student: It will stay where it is.

Morada female student: Yeah. It will stay where it is.

Ms. Maurillo: Thank you. Cardozo Middle School in Washington, DC, do you have a question for this team?

Cardozo female student: Yes, we do. How will the car filter the water?

Morada male student: It doesn't filter it. It goes through the system, and it creates hydroelectric energy that goes to the battery that will power the car.

Ms. Maurillo: Okay. Thank you very much. I believe those are all of the questions. Thank you very much. (Applause.)

CARDOZO MIDDLE SCHOOL



Pneumo: A Carpooling Vehicle

Ms. Maurillo: Cardozo Middle School, you had dropped off of the transmission when your turn came up, so we will go ahead with you now. We had skipped over to Morada, but we will go back to Cardozo if you are ready to make your presentation now. Is that okay?

Cardozo female student: Yes.

Ms. Maurillo: Okay, great. You may go ahead with your presentation, please.

Luwam Seyoum: Hello. My name is Luwam Seyoum, and I am the communications specialist.

Long Pham: Hi. I'm Long Pham, and I'm the design engineer.

Ryan Rodriguez: Hello. I'm Ryan Rodriguez, and I am the mechanical engineer.

Kaitlyn Murphy: Hello. I am Kaitlyn Murphy, and I am the supervisor, and together we are—

Chorus: Transcend!

Female student: About us: We were founded in 2013 by TransScend, Incorporated, in the Washington, DC, metropolitan area. TransScend has been an eco-friendly-based company dedicated to helping the Earth by addressing issues for a sustainable mode of transportation. Headquarters is currently located at the Cardozo Education Campus. We hope you enjoy our product as much as we enjoy offering it to you.

Our mission: We want to decrease high amounts of pollution by substituting fossil-fuel vehicles with air-powered vehicles. We want to transcend into the future, and create sustainable modes of transportation that will not only change the way that people commute, but also save money and preserve the ozone layer.

Male student: The problem: Time wasted because of public transportation. Too much littering, air pollution, and hazardous chemicals are destroying the ozone layer, which [is] causing problems in health, global ice caps melting, and climate changes, and et cetera. Non-renewable sources will eventually run out like gasoline. People are wasting too much money on fossil-fuel gas.

Male student: The solution: Our product, Pneumo, is a car-pooling vehicle intended to cut down emissions produced from rush hour. It is a vehicle that runs on natural air. Instead of polluting the environment, Pneumo will take in regular air, and emit regular air. Our product will be available to local companies to increase car-pooling and reduce independent commuting. Companies can save their employees money by using Pneumo's services.

Male student: How does it work? Pneumo is powered with pneumatics. When air is compressed to a pressure of 100 psi, pounds per square inch. The air pressure is stored in a 3,200-cubic-[foot] tank. The pressure of the air's expansion will push against the piston and turn the crankshaft. The crankshaft will propel the vehicle.

This is a model of our engine. The orange space is where the air is compressed to 100 psi. The little tube connected to the engine is where the pistons are pushed up and down, which turn the crankshaft, which [turns] the wheels.

Male student: Carbon fiber. Me and my company had to think of a type of material that would be good to use for the car. We thought of carbon fiber, and figured it would be a light-weight material that is used to construct the body of the car. The tank in Figure C has a volume of 3,200 cubic feet, and it is also constructed of the carbon fiber. It operates

pressures up to 100 psi.

Male student: Providing car-pooling services to companies at low cost will help them save money other than gas-powered cars. You commute to work together, save money together, and save the environment together.

Female student: Fossil Fuel vs. Pneumatic: In this slide, we have our graph that shows, over a one-month period of time, the average driver spends \$200 on fossil-fuel gas. When using Pneumo, you only spend \$24 for the same amount of mileage, and that's a lot less money spent!

Male student: For a Pneumo car, two fill-ups for \$6 can achieve approximately 300 miles. For seven passengers, \$100 on Pneumo service will be cheaper. Each passenger spends about \$14 weekly. Employees save \$35 weekly.

For a \$50 full tank for a fossil-fuel car, you can get approximately 300 miles. Seven passengers spend about \$350 on fuel-gas weekly. Each passenger spends about \$50 weekly, and employees save no money. Air fueling stations will be initially installed at cooperating gas stations for free. Service is offered at a low cost of \$100 per month.

Female student: Here are the government stats on going green. We felt that, in order to successfully sell this product, we needed to tell you about all what the government says about pollution as it relates to motor vehicles.

In 1950, the Environmental Protection Agency, EPA, declares cars as mobile sources of pollution. In 1973, EPA releases a study confirming that lead from automobile exhaust poses a direct threat to public health. In 1989, for the first time, EPA sets doable utility limits aimed at reducing evaporative emissions. In 2008, EPA announces availability of \$50 million in grant funding for the reduction of gasoline to establish clean gasoline projects aimed at reducing emissions from the nation's...existing collection of fossil-fuel engines.

Female student: Grams of CO₂/gal Emission Chart 3: In this graph, it shows cars using gasoline emit 8,887 grams of carbon dioxide per gallon. Cars using diesel emit 10,187 grams of carbon dioxide per gallon. But, while using Pneumo, there are zero grams of carbon dioxide emitted into our atmosphere, because we are using compressed air.

Female student: Here's how Pneumo affects the economy. Local companies and other groups can utilize the service, which also create jobs with car-pooling services, [which] can allow the opportunity to have better ideas. Money saved from gasoline spending could result in an increase in potential factors such as upgrades from personal gasoline cars to personal air cars and investments into stocks and businesses.

How Pneumo affects the commute. I don't know if any of you have ever used public transportation in a city area, but being from Washington DC, public transportation is the number-one mode of transportation, and we are constantly affected by the commotion that is rush hour. Sometimes leaving one hour early is not enough time to prepare for the many surprises you might encounter during rush hour.

Trains might single-track or be delayed for one reason or another. If you are taking the bus, detours can interrupt the bus's route, leaving the engine running, and causing it to emit horrible fumes into the atmosphere. Now he has to avoid global warming while running extremely late for work. Sometimes, it seems like a "lose-lose" situation relying on today's transportation. Pneumo decreases the most important issues that we face in our area. It provides companies with a safe, eco-friendly way to transport their workers.

Another way Pneumo affects the commute: It reduces rush-hour traffic, creates a better system to travel to work, and paves the way for cleaner transportation solutions. If half of the drivers stuck in traffic used Pneumo, would we still have rush hour? Pneumo contributes to lesser vehicles on the road. It avoids stress and transcends into the future.

Male student: Advantages and disadvantages. Okay. Some advantages of using Pneumo are pure air that processes no emission from cars, and only takes \$3 worth of electricity to fill up the tank. Each refill provides 160 miles. Using Pneumo, there are zero grams of carbon-dioxide emissions compared to 8,000 to 10,000 grams of carbon-dioxide emissions.

Pneumo requires less maintenance and car parts. And, in an accident, tanks are made of carbon fiber, which are designed to crack rather than shatter in a crash. The more Pneumo cars we have on the road, the less the need of fossil-fuel cars, and employees save money towards transportation.

Male student: Unfortunately, there are some disadvantages to using Pneumo. Refilling the tank can take up to two hours if done at home and not at the service station. Long drives are limited because air-refuel stations will be limited while promoting air-car products. Limited only to designated stops, and not for any leisure stops.

What makes a vehicle sustainable transportation? A vehicle that makes a positive contribution to the community, socially, economically, and environmentally. Environmentally, it's eco-friendly, and it's renewable by sustaining consistency between generations.

Male student: Is Pneumo sustainable? Pneumo is a vehicle that allows for cleaner air. Would you prefer breathing carbon-dioxide chemicals or breathing air? Are you tired of complaining [about] high gasoline prices? Can you afford \$15 a week for transportation to work? Then Pneumo is your future of sustainable transportation.

Ms. Maurillo: Thank you very much. (Applause.) Now we'll start with the questions. Let's see. Morada Middle School from Stockton, California, Caltrans District 10, do you have a question for this team?

Q&A FOR CARDOZO MIDDLE SCHOOL

Morada female student: This engine needs a compressor to build pressure in the tank. Where is the compressor, and what powers it?

Cardozo male student: For the compressor of the engine, it can compress air up to about 100 psi, pounds per square inch. That's how much it would need to at least do a few miles, like a few hundred miles.

Ms. Maurillo: Findlay Middle School, North Las Vegas, do you have a question for this team?

Findlay male student: Yes. If you were to sum up the problem and solution into one sentence, what would it be like?

Cardozo female student: Can you repeat the question?

Findlay male student: If you were to sum up the problem and solution into one sentence, what would it be like?

Ms. Maurillo: If you could sum up the problem and solution in one sentence, what would it be like?

Cardozo male student: Are you referring to Pneumo?

Findlay male student: Yes.

Cardozo male student: Ah, yes. (Inaudible remarks.) Well, for Pneumo, for the problem and solution, if I were to sum it up, it would be something like this. "For Pneumo's good, good qualities, you have clean air, lesser traffic, and you have a good safety rating; for its disadvantages, you would have less, you could make less stops, you couldn't drive that far, and long travels wouldn't be available that much. Thank you.

Ms. Maurillo: Okay. Toddy Thomas Middle School, Fortuna, California, do you have a question for this team?

Toddy Thomas female student: Which team?

Ms. Maurillo: For the team that just presented, the one from Washington DC.

Toddy Thomas female student: Team One or Team Two?

Ms. Maurillo: Oh, I'm sorry. Second Team, please.

Toddy Thomas Second Team female student: Okay. How will a 3,200-cubic-foot tank fit in a car?

Cardozo male student: That's a good question!

Cardozo male student: Well, the car is going to be a "car," *per se*. It's going to be a van, a very big van, but it's going to be lightweight, so it can still be powered by the air. It's going to be very big, so the tank will be stored under the car, like a regular car, but it won't be using gasoline.

Ms. Maurillo: Thank you. Toddy Thomas Middle School, First Team, do you have a question?

Toddy Thomas First Team male student: Yes. How will you get the energy to compress the air?

Cardozo male student: Cooperating gas stations. There will be air fueling stations, so you can refill. At home, you wouldn't be able to refill your car at home, because it would take at least two hours; but, at cooperating gas stations, you will be able to refill it in at least three minutes because you have more electricity at a gas station.

Ms. Maurillo: Thank you. Juan Crespi Middle School from El Sobrante, California, do you have a question for this team?

Juan Crespi male student: Yes. How will car-pooling be set up through Pneumo? Like will you have to call something? Or will there be like something like bus stops?

Cardozo female student: So you will set an appointment, date, time, and we'll come to you at the time that you would like, and like it seats up to eight people, so there will be enough space for how many people that there's needed.

Female student: Thank you!

Ms. Maurillo: Thank you very much. (Applause.)

FINDLAY MIDDLE SCHOOL



Self-serve Power Charging Stations for Electric Cars

Ms. Maurillo: Next team to present will be Findlay Middle School from North Las Vegas, Nevada, sponsored by the University of Nevada at Las Vegas.

Male student: Yes, we are ready!

Ms. Maurillo: Okay. Go ahead, please!

Victor Amigo: Hello. My name is Victor Amigo, and we represent Clifford O Findlay Middle School in North Las Vegas, Nevada. I will let our team introduce themselves and share their roles.

Daniel Philbin: My name is Daniel Philbin, and my role included research and development.

Grady Formaster: Good morning and afternoon, everyone! My name is Grady Formaster, part of the research and design team. Hillary Brooke, our quality-control officer, was out sick today.

Male student: We would like to open by first saying thank you to Dr. Teng at the Howard Hughes School of Engineering here at UNLV for sponsoring and supporting Findlay Middle School through this process. Additional thanks to Mineta for allowing us to participate and share our ideas for a sustainable future.

Fossil fuels, although abundant, with new reserves being discovered annually, will eventually become depleted; but harmful effects on the environment from CO₂ emissions, as a result of burning these fossil fuels, is something that future generations will have to prioritize in the coming decades.

The exciting news is that technology exists with which change can occur. Whether due to high costs or lack of public support, sustainable transportation options and the opportunities wait untapped. We feel it's time to wake up public opinion in response to sustainable-transportation opportunities to get electrified. With that, we would like to share our plan to expand and upgrade the flow chain that we're currently operating throughout the United States.

Male student: Our focus was much more localized, though, and we concentrated on the route to the west, specifically between Las Vegas and Carson City, our capital, and the trip from Las Vegas to Salt Lake.

Male student: Successful car corporations, Nissan, Ford, Cadillac, Toyota, and other companies and like-minded people, with their green concepts, are out there. The curious and environmentally-minded consumer wonders if their next vehicle should be a hybrid of some kind, or maybe fully electric.

Sadly, the current knocks in public opinion on electric cars is that the cars are too small, that they have questionable safety systems, and no storage, and, of course, the little cars have only short-trip capabilities. Our team discovered something quite different, though.

Male student: When researching the topic of electric-hybrid vehicles, as well as totally-electric, questions that returned time and time again included, "Where do you recharge?" "How far can you go before recharging?" "What about the cost?" "Is there a fee?"

Exploration of this topic led us to look at the cost of existing systems and technologies. State-funded and local plans work best in the utilization of the locations of recharging stations, the distance between current opportunities, and any costs associated with (inaudible).

Male student: Utilizing the online app, PlugShare, we discovered that there are currently 16 charging opportunities in and around the greater Las Vegas area on the PlugShare app, and all are free of charge; but not all have 24-hour access. What we found was point and road-trip options, but that a trip could either start with video constantly, would take some creative route planning, as gaps of hundreds of miles exist between stations, but some stations existed, but off the main highway. Our plan is to fill those gaps with self-serve, solar-powered recharging stations.

Male student: Well-stated, Victor! The model shows [what] our station might look like. When reading and doing the research things, existing materials would cut costs, and should always be explored; but the breakdown of costs and materials would go like this: Besides the initial cost of materials, installation would be a good share of the expense. Current rates for electricians and solar-panel installers in our area are \$75 per hour. That is why building a prefabricated unit makes a lot of sense. This will help control and cut costs, ensure uniformity, and quality control, and make servicing easier and more cost-effective by assembling a team to prefabricate units, locate and use repurposed and recycled materials whenever possible. We feel this can happen. As each middle EV charging station opens, they can, in turn, be added to the PlugShare app and will be added to the map. Total cost is approximately \$35,000, depending on location, and if there will be a connection to the grid.

Male student: There's a number of pre-existing signs available both to the traffic to and from the EV stations, and to identify the minutes; so costs range from ten to hundreds of dollars. In addition, depending on state, federal, and local regulations, it may include, as well, some usage fees and tap fees. Grants are available. Recent legislation in Washington state, Oregon, and California, is related to extend the sign for along highways, especially. You can see the sign displayed behind me. Full details can be reviewed at West Coast Green Highway dot com. We're sure it's just a matter of time until Nevada and Arizona adopt this sign, as well.

(<http://www.westcoastgreenhighway.com/evsigns.htm>)

Male student: Thanks, Dan! When considering our recharge units, there are a lot of options. The team discovered dozens of varying designs, applications, and certainly costs. We chose the blank stations currently being used across the western states. We wanted two cars to be able to use the station at one time, with the ability to charge two additional vehicles using their own cables, and given the abundance of renewable energy, in the form of sunlight, besides the grid power links, would be solar-powered whenever possible.

Thinking about the drivers, the two powering cars would be under the shade of a canopy. We thought of adding a hydration station under there, too. This would reduce CO₂ emissions by 19.6 pounds of every gallon of gas saved, and an estimated 7,245 pounds based on 10,000 miles of driving.

Male student: Mechanical systems are inherently troublesome, and we anticipate the need of the servicing. Then we'll get to see where, as well, will, add to operating costs; but this is true with any service, especially one that could potentially be 100 miles from anywhere. By operating a small fleet of service vehicles — all EV, of course! — and using our own team of technicians, we can keep this cost at least manageable.

In closing, we would like to thank everyone for allowing us to share our sustainable-transportation ideas, in the hope that, by doing so, we excite others to join the move toward a greener future, because, as we all know, in order to be sustainable, we must first meet the needs of the present without compromising the ability of future generations to meet their own needs.

Chorus: Thank you.

Male student: And now we will be entertaining questions. (Applause.)

Q&A FOR FINDLAY MIDDLE SCHOOL

Ms. Maurillo: Thank you very much, Findlay Middle School. Our first question will come from Toddy Thomas Middle School, Second Team. Do you have a question for this team, please?

Toddy Thomas Second Team female student: In our state, California, gas stations are privately owned; so how would states like California get this system?

Findlay male student: They already have EV stations in California. We are trying to get it, because, in all the states around Nevada, we are trying to get it *in* Nevada.

Findlay male student: In other words, we're trying to add (inaudible).

Findlay female student: We are trying to add more.

Ms. Maurillo: Thank you very much. Toddy Thomas Middle School's First Team, do you have a question for this team?

Toddy Thomas First Team male student: Yes, we do. How is it an original idea?

Findlay male student: Well, like I said before, we've already had EV stations. We are just trying to put more in the United States, and, especially, we don't have very much in Las Vegas, or Nevada itself.

Findlay male student: Yes. We really (inaudible). What I see on close tiers, yes. There are actually EV stations like not even scattered. They are more in one group, in like four-corners, technically. They're not independent, so — in Nevada.

Ms. Maurillo: Okay, thank you. Juan Crespi Middle School, from El Sobrante, California, do you have a question for this team?

Juan Crespi male student: Yes, we do. So you're saying that you're trying to add these stations into more expansive locations, but where will you get the funding? Funding to add these different locations throughout the United States?

Findlay male student: We are (inaudible) — federal grants.

Juan Crespi male student: Okay. So, through programs like the ones that are hosting us now? Okay.

Ms. Maurillo: Thank you very much. Cardozo Middle School in Washington, DC, do you have a question for this team?

Cardozo male student: How much money would be needed to spread your construction or service?

Findlay male student: Like he said, it would take \$35, depending on location.

Findlay male student: It's \$35,000.

Findlay male student: Yeah, \$35,000, depending on location; and it would take \$75 per hour for a solar-panel installer to put [an] EV station in.

Ms. Maurillo: Thank you very much. Morada Middle School, Stockton, California, do you have a question?

Morada female student: Yes, we do. How do you put (inaudible) and test from the system?

Findlay male student: They're linked together.

Findlay male student: We (inaudible) with a blacktop system.

Morada female student: How do you prevent vandalism and theft from the system?

Findlay male student: We know it's going to happen, so we'll think of something, though.

Findlay male student: We can't really prevent it. We can't really prevent vandalism, but that's just one of the many problems that — People like to spray-paint and misuse our EV charging stations. So we can't, really.

Findlay male student: But we can put (inaudible).

Findlay male student: Yeah. Other than putting somebody there, and watching guard, you can't really watch it, but the best you can do is hope for the best. If people use their brains, then it won't happen.

Findlay male student: And respect property.

Findlay male student: Yes!

Ms. Maurillo: Thank you very much! (Applause.)

TODDY THOMAS MIDDLE SCHOOL SECOND TEAM



Seawater-powered Cargo Ship

Ms. Maurillo: And our last team to present today, Toddy Thomas Middle School, Fortuna, California, Second Team.

Female student: “From Highways to Seaways,” by Sophie Stringer, Jessie Hess, and research done by Tacy Georgeson.

Female student: Our objective is to create a concept that addresses issues concerning transportation, and make it more sustainable.

Female student: Our idea is to create a cargo ship that will be sitting in its own fuel. It will be powered by the seawater underneath it. It will travel from port to port delivering goods, and eliminating the need for semi trucks.

Female student: How it operates. The bottom of the ship will be enclosed except for pipes that take the water and separate it into three chambers.

Female student: Sea Water to Energy. The method we are using to separate the water is called a three-chamber cell. The chamber cell separates the water into its basic parts. One of the main parts, the hydrogen, will be used to fuel the ship.

Female student: Reducing the Need for Trucks. Trucks utilize a large percentage of the fossil fuels we use. By building a cargo ship that runs off of sea water, we will minimize

the use of trucks, which also minimizes the use of fuel. One truck does the damage of 8,000 cars, and one cargo container equals the size of one truck. By using ships instead of trucks, we will consume less time, money, and reduce the amount of fossil fuels used to repair roads.

Female student: Benefits of Floating in Fuel. There are many benefits of our ship. It would eliminate fuel stops, because you can create fuel on the go. It would minimize pollution like oil spills. Also, it would reduce the amount of semis on the road, which means less maintenance on roads — therefore, less time and fossil fuels spent fixing the roads.

Female student: Convenience. If we converted all ships into non-fuel users, it would eliminate all fuel stops, and save more time, because the fuel is converted on the go. Minimizing trucks, minimize repair on roads, getting rid of a large percent of fossil-fuel use.

Female student: Practical. Our idea would be a big investment at first, but would pay off in the long run. There would be less time, money, and fossil fuels used on roads because of the trucks being taken off the road. One semi truck is costing about \$1,700 a week just from going [from] Humboldt County to Oakland, which is about a 5 1/2-hour drive. Our idea would be saving a big fraction of that.

Female student: The reason why our idea is a good method of sustainable transportation is it eliminates some uses of fossil fuels, and minimizes negative impacts on the environment.

Female student: Thank you for considering our idea, and spending your time evaluating it. We've learned a lot from this great opportunity, and really enjoyed the process.

Q&A FOR TODDY THOMAS MIDDLE SCHOOL SECOND TEAM

Ms. Maurillo: Thank you very much! (Applause.) We'll begin with the questions. The first question comes from Toddy Thomas Middle School, First Team. Do you have a question for this team?

Toddy Thomas First Team male student: Yes. How fast can the boat go?

Toddy Thomas Second Team female student: The boat can go about 26 miles per hour, but it depends on the weather, and the conflict that comes with it.

Ms. Maurillo: Thank you very much. Juan Crespi Middle School, El Sobrante, California, do you have a question for this team?

Juan Crespi male student: Yes, we do. How will it separate clean water from algae, sea life, and other — and others who (inaudible, whispering) — Oh.

Toddy Thomas Second Team female student: Well, in the three-chamber cell, it would be separating the water into hydrogen, oxygen, and then the other stuff, and we would be using the hydrogen.

Toddy Thomas Second Team female student: And there would also be a net separating the water from other things in the ocean, so only water goes into the ship.

Ms. Maurillo: Cardozo Middle School in Washington DC, do you have a question for this team?

Cardozo female student: Okay. What if you need to deliver cargo to areas that aren't near water?

Toddy Thomas Second Team female student: Well, our idea would start out in places like Humboldt County to Oakland, which is where our cargo ships come from; but, in the future, when the idea has more progress, there are cargo ships that go into rivers, also.

Cardozo male student: Thank you.

Ms. Maurillo: That was Cardozo? Okay. The next question comes from Morado Middle School from Stockton, California. Do you have a question, please?

Morada female student: What is going to separate the water into three chambers?

Toddy Thomas Second Team female student: The device is called a three-chamber cell. That is, it's already a device. It's used to separate the water.

Toddy Thomas Second Team female student: The pipes would guide the water into the chamber.

Ms. Maurillo: Findlay Middle School, North Las Vegas, do you have a question for this team?

Findlay male student: Yes, we do! How would you prevent mold from forming inside the chambers?

Toddy Thomas Second Team female student: Can you repeat that, please?

Findlay male student: How would you prevent mold from forming inside the chambers?

Ms. Maurillo: How would you prevent mold from forming inside the chambers?

Toddy Thomas Second Team female student: There would be cleaning at ports. They would clean it out.

Toddy Thomas Second Team female student: Just like any ship.

CLOSING REMARKS

Ms. Maurillo: Thank you very much. (Applause.) Well, that concludes all six team presentations, and everybody had a chance to ask questions of each team. I must say that the questions and the responses have definitely improved over the past couple years since we started allowing the questions. I would like to thank the teachers and the mentors, especially, for guiding these teams, and for improving the quality of the presentations.

In my seven years of participating in this, I have seen improvements come every year. It seems that the districts, the sponsors, and the teachers, and their mentors, have learned quite a bit each time they do participate, and they've been able to hand it down to the students.

So I'd like to thank all of you very much, and especially knowing that this is an extra-curricular activity for the teachers, the mentors, and the sponsors. I know that that takes extra time for you. And I really appreciate — all of us really appreciate — the time and effort that you do put into this.

I would like to thank you again for the quality of the presentation and the time you put into it. I would like to thank our judges. Thanks to Caltrans for overseeing and managing the broadcast. And thanks to all the sites that permitted the students to come in and do their demonstrations, and especially thank you to the students. I always have to remind myself after each of these presentations that you are seventh- and eighth-graders and that you are not college students because I think the quality of many of your presentations is really at a college level.

So thank you very much. The judges will review the scores, add them up, and we will let you know within the week who the winners will be. Are there any questions, any questions at all?

Male student: Wait, wait!

Ms. Maurillo: Yes. Do you have a question?

Male student: You're going to tell us like this upcoming week who won?

Ms. Maurillo: This upcoming week. This is Thursday. Probably by next Wednesday we'll have the announcements made.

Male student: Okay. Thank you.

Ms. Maurillo: All right. Thank you very much, and we'll see you again next year. (Applause.)

APPENDIX A: ABOUT GARRETT MORGAN

GARRETT AUGUSTUS MORGAN, 1877–1963

Garrett Augustus Morgan, for whom the US Department of Transportation Technology and Transportation Futures Program is named, was born in Paris, Kentucky, in 1877. The seventh of 11 children, his parents were former slaves. Although his formal education ended at the sixth grade, Garrett Morgan went on to become a world-famous inventor and entrepreneur.



Figure 1. Garrett Augustus Morgan as a Young Man

Despite his humble beginnings and lack of formal education, Mr. Morgan made a great impact on the transportation industry. But it was only after his death in 1963 that Mr. Morgan was awarded a citation by the US government for his significant inventions.

Not only did he invent the zig-zag attachment for sewing machines, but he also invented the first successful gas mask and used it himself to rescue several men trapped in a tunnel. Many fire departments ordered the mask, but when they found out that the inventor was a black man, they canceled their orders. He had to hire a white man who pretended to be Garrett Morgan so people would buy the masks.

In 1923, Mr. Morgan invented and patented a successful traffic signal. It was during this time that automobiles were becoming common, sharing the nation's streets with bicycles, horse-drawn vehicles and pedestrians. Collisions were frequent and often bloody. After witnessing such an accident in Cleveland, Ohio, Mr. Morgan decided to invent a device to make the flow of traffic safer. The Morgan Traffic Signal was a T-shaped pole topped with three illuminated signs — stop, go, and an all-directional stop that let pedestrians cross the busy street.

At night, or when traffic was minimal, the Morgan signal could be positioned at half-mast, alerting approaching motorists to proceed through the intersection with caution. This

technology was the basis of the modern-day traffic signal and was a significant contribution to what we now know as Intelligent Transportation Systems.

The Mineta Transportation Institute presents an annual symposium by videoconference as part of its mission to provide technology transfer, education and research on current issues and emerging solutions in sustainable surface transportation. The videoconference is part of the Garrett A. Morgan Technology and Transportation Futures Program, which was established by the Honorable Rodney Slater, former secretary of the US Department of Transportation.

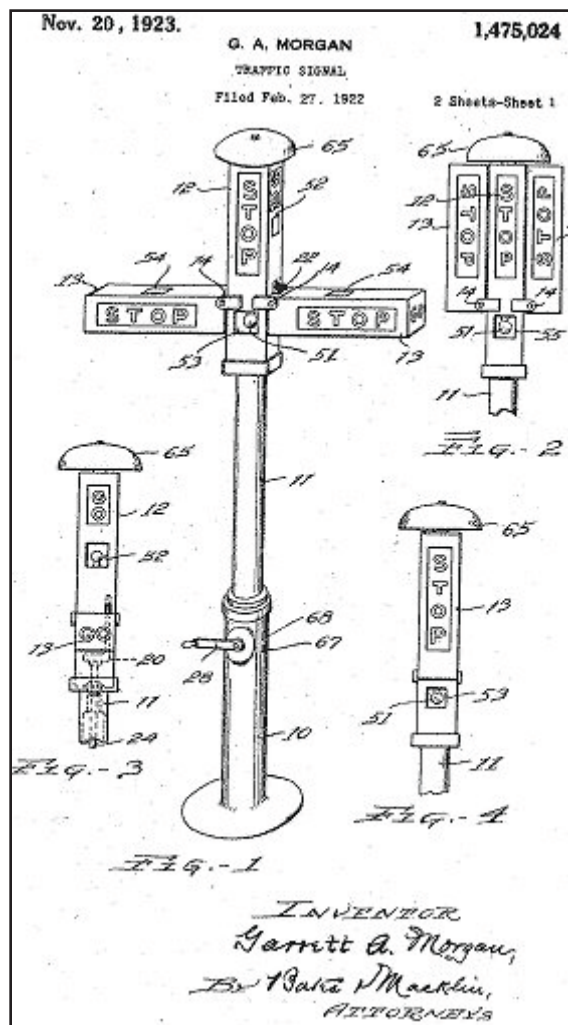


Figure 2. Garrett Morgan's Traffic Signal

Teachers and students address the topic of sustainable transportation and propose innovations for surface transportation. The purpose of the symposium is to stimulate the minds of young people and encourage them to excel in mathematics and science, which could lead to careers in transportation engineering, transportation planning, environmental science, public transit, and innovations in transportation safety and security.

Through the work of many people, this event and this publication add to the spirit of transportation innovation and progress that Garrett Augustus Morgan personified so well.

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