Announcer: Please welcome Carol Sugars, pilot of the world’s first biofuel powered jet. [APPLAUSE]

Carol Sugars: Thank you. Well, it’s an honor and I’m very humbled to be invited to present today.

It’s also somewhat ironic as I think you all will see towards the end of my presentation why it is somewhat ironic that I’m here to share my ideas on what I consider to be the inspiration of innovation.

It’s my opinion that it takes inspiration to be innovative, and I’m going to share a small project that I was involved in,

and then explain to you why I think I have the ability to innovate in the way that we do in the project.

It’s October 2007, I’m taking off for Reno, Nevada in an aircraft powered entirely by biofuel. There’s not an ounce of petroleum-derived fuel in the airplane.

The fuel was manufactured from, in this case recycled vegetable oil, 100% of it.

They said it couldn’t be done but we proved otherwise.

This garnered quite some attention, got me in the "Guinness Book of Records."

The following year in 2008 we decided to capitalize on what we did, and we decided to take the aircraft coast to coast.
We flew from Reno, Nevada, in October of 2008 and landed in Leesburg, Florida, in November.

This again garnered some attention in the media.

The goal of the project was not engineering test flight or fuel development.

The reason we were happy to be in the media was that the whole point behind the project was to raise awareness.

It was to raise awareness of the fact that we can use biofuels in aviation.

It was also proof of concept. Yes, look, we can do this.

We used technology that was developed, the aircraft was manufactured in 1968,

the technology to manufacture the fuel is pre-world war II technology.

It was not a fuel development program and it was not an engineering test flight program,

although we did have to do some test flying in order to make the project possible.

The aircraft that we used was an aero body, try saying that fast,

l-29 dolphin jet advanced trainer used by the soviet bloc in the pre -- in the cold war days.

The fuel that we used is another word, try saying this fast, a transesterfied methyl oil trans fatty acid.
I'm not a chemist. Transesetrfication makes vegetable oils and moves a few atoms or molecules around and turns vegetable oil into an essentially usable fuel.

The limitations and challenges to using a biofuel in a turbo jet were three materials compactability, cold flow and energy density, I designed and had built a small test cell with an engine similar to the one the same as the one in the aircraft to prove that the fuel was safe and usable and we mitigated all of these limitations, just operationally.

We did not have to redesign or do any modifications to the engine, and the energy density we just had to allow for the fact that the fuel is slightly less energy, contains less energy per unit weight or unit volume than jet fuel.

My role in the project, well, I was the test pilot, I was the pilot that was approved by the FAA to fly the aircraft, and I did all the operational the planning and designed the flight test programs.

Assembled a small team, we had to have a chase aircraft, we had to have a lot of collaboration with various other stakeholders such as the aircraft,
support aircraft pilots, the airfields that we went to.

My partner throughout all of this was his overall vision to do a biofuel and aviation project.

He looked after all of the financing, all of the media, and all of the sponsorship arrangements.

We decided video everything we made a was a documentary video that was seen on the discovery channel,

it was very daunting having a cameraman looking at you all the time while

you're doing a somewhat high profile and interesting flight test program.

However, when we pressed on with the camera pointing at us all the time,

significant amount of collaboration obviously. We had to collaborate with the FAA.

This is a photograph from somebody from the FAA actually smiling.

We kept him happy, I managed to keep him happy and he let us do the flight.

We had a chase aircraft, trained chase aircraft pilots in the chase aircraft we put some of the refueling

equipment for the I-29 and the cameraman, and all of the associated support equipment we needed.

The fuel had to be prepositioned across the country of the tannery fueling stops,

obviously you can't call your local jet biofuel fuel truck to fuel up the
airplane so we had to preposition the built.

Designed and built a small refueling unit so we could refuel the aircraft en route or on the ground.

The sponsors began a theme of collaboration, we had sponsors that we organized that went with us along the way and in Leesburg the end of the project we landed, didn't really hurt ourselves or break anything,

and I think it was a pretty successful project overall.

People have described it as innovative.

We were the first people to do this, and how did I get the inspiration to be innovative and do this?

I'm from a small town in England, working class northern town, an industrial revolution town.

As I was a child growing up, the view on the horizon from my bedroom was like this,

the two arrows indicate a water tower and a TV antenna,

which as I was a little older I walked up and actually took a look at.

What has this got to do with innovation?

I would look out of my window, see these things on the horizon and to a young 5-year-old growing up in the '60s, watching the space race on TV, they were rockets.
They were rockets sitting on launch pads.

I would sit there dreaming and hoping that one day they would sprout flame and just take off.

I launched them many times from my bedroom.

Something else we had obviously growing up to watch this, we had the TV, and we had radiogram,

and these to me were my mission control and launch control center.

I was fascinated by these things, glowing screens in the night.

I was fascinated by what made the TV work, and when the TV broke I couldn't wait for the repairman to come and fix it, I could look in the back and see what made it tick.

It inspired me. I went on, as I grew older, joined the royal air force and ended up working in a room full of screens, darkened room, traffic control.

Later on instead of looking at an orange blip on the screen I became an orange blip on the screen,

currently an airline pilot, that's my day job.

I've been involved in investigative and innovative projects.

The ones I'm most proud of you obviously the biofuel flight.
I've also worked on some mag life systems and noise cancellation technology. My inspiration through all of this has been other people and looking at other projects and other ideas.

I'm inspired to innovate by the novel approaches and successes of others, and this is what I feel it takes.

No fear of failure, a basic understanding of science and engineering, application of the relevant principles irrespective of existing paradigms, mental effort, you've got to imagine what can be, not what is, it takes physical effort of trial and error, openness to criticism and confidence in your ideas.

That is what I feel has enabled me to innovate. Thank you very much.

[APPLAUSE ]