
BIOFUELS

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00:00:01,670 --> 00:00:08,320
\h Announcer: Please welcome Carol Sugars, pilot of the world's first biofuel powered jet.[APPLAUSE]

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00:00:08,320 --> 00:00:15,680
\h Carol Sugars: Thank you. Well, it's an honor and I'm very humbled to be invited to present today.

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00:00:15,680 --> 00:00:23,480
\h It's also somewhat ironic as I think you all will see towards the end of my presentation why it is somewha

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00:00:23,480 --> 00:00:30,000
\h ironic that I'm here to share my ideas on what I consider to be the inspiration of innovation.

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00:00:30,000 --> 00:00:35,460
\h It's my opinion that it takes inspiration to be innovative,

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00:00:35,460 --> 00:00:39,840
\h and I'm going to share a small project that I was involved in,

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00:00:39,840 --> 00:00:47,370
\h and then explain to you why I think I have the ability to innovate in the way that we do in the project.

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00:00:47,370 --> 00:00:55,690
\h It's October 2007, I'm taking off for Reno, Nevada in an aircraft powered entirely by buy bio fuel.

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00:00:55,690 --> 00:00:59,810
\h There's not an ounce of petroleum-derived fuel in the airplane.

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00:00:59,810 --> 00:01:06,370
\h The fuel was manufactured from, in this case recycled vegetable oil, 100% of it.

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00:01:06,370 --> 00:01:09,270
\h They said it couldn't be done but we proved otherwise.

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00:01:09,270 --> 00:01:14,790
\h This garnered quite some attention, got me in the "Guinness Book of Records."

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00:01:14,790 --> 00:01:18,940

\h The following year in 2008 we decided to capitalize on what we did,

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00:01:18,940 --> 00:01:22,000
\h and we decided to take the aircraft coast to coast.

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00:01:22,000 --> 00:01:32,950
\h We flew from Reno, Nevada, in October of 2008 and landed in Leesburg, Florida, in November.

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00:01:32,950 --> 00:01:39,190
\h This again garnered some attention in the media.

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00:01:39,190 --> 00:01:45,850
\h The goal of the project was not engineering test flight or fuel development.

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00:01:45,850 --> 00:01:49,420
\h The reason we were happy to be in the media was that the whole point

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00:01:49,420 --> 00:01:51,790
\h behind the project was to raise awareness.

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00:01:51,790 --> 00:01:58,080
\h It was to raise awareness of the fact that we can use biofuels in aviation.

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00:01:58,080 --> 00:02:01,200
\h It was also proof of concept. Yes, look, we can do this.

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00:02:01,200 --> 00:02:06,950
\h We used technology that was developed, the aircraft was manufactured in 1968,

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00:02:06,950 --> 00:02:11,410
\h the technology to manufacture the fuel is pre-world war II technology.

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00:02:11,410 --> 00:02:15,320
\h It was not a fuel development program and it was not an engineering test flight program,

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00:02:15,320 --> 00:02:21,650
\h although we did have to do some test flying in order to make the project possible.

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00:02:21,650 --> 00:02:26,450
\h The aircraft that we used was an aero body, try saying that fast,

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00:02:26,450 --> 00:02:37,370
\h l-29 dolphin jet advanced trainer used by the soviet bloc in the pre -- in the cold war days.

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00:02:37,370 --> 00:02:45,890
\h The fuel that we used is another word, try saying this fast, a transesterfied methyl oil trans fatty acid.

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00:02:45,890 --> 00:02:52,640
\h I'm not a chemist. Transesetrfication makes vegetable oils and moves a

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00:02:52,640 --> 00:03:00,110
\h few atoms or molecules around and turns vegetable oil into an essentially usable fuel.

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00:03:00,110 --> 00:03:07,260
\h The limitations and challenges to using a biofuel in a turbo jet were three materials compactability,

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00:03:07,260 --> 00:03:16,140
\h cold flow and energy density, I designed and had built a small test cell with an engine similar to the one

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00:03:16,140 --> 00:03:19,830
\h the same as the one in the aircraft to prove that the fuel was

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00:03:19,830 --> 00:03:26,730
\h safe and usable and we mitigated all of these limitations, just operationally.

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00:03:26,730 --> 00:03:31,980
\h We did not have to redesign or do any modifications to the engine,

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00:03:31,980 --> 00:03:39,190
\h and the energy density we just had to allow for the fact that the fuel is slightly less energy,

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00:03:39,190 --> 00:03:44,030
\h contains less energy per unit weight or unit volume than jet fuel.

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00:03:44,030 --> 00:03:48,910

\h My role in the project, well, I was the test pilot,

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00:03:48,910 --> 00:03:52,650
\h I was the pilot that was approved by the FAA to fly the aircraft,

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00:03:52,650 --> 00:03:58,660
\h and I did all the operational the planning and designed the flight test programs.

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00:03:58,660 --> 00:04:02,910
\h Assembled a small team, we had to have a chase aircraft,

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00:04:02,910 --> 00:04:08,160
\h we had to have a lot of collaboration with various other stakeholders such as the aircraft,

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00:04:08,160 --> 00:04:14,530
\h support aircraft pilots, the airfields that we went to.

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00:04:14,530 --> 00:04:24,200
\h My partner throughout all of this was his overall vision to do a biofuel and aviation project.

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00:04:24,200 --> 00:04:32,350
\h He looked after all of the financing, all of the media, and all of the sponsorship arrangements.

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00:04:32,350 --> 00:04:38,990
\h We decided video everything we made a was a documentary video that was seen on the discovery char

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00:04:38,990 --> 00:04:43,220
\h it was very daunting having a cameraman looking at you all the time while

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00:04:43,220 --> 00:04:48,600
\h you're doing a somewhat high profile and interesting flight test program.

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00:04:48,600 --> 00:04:53,730
\h However, when we pressed on with the camera pointing at us all the time,

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00:04:53,730 --> 00:05:00,090
\h significant amount of collaboration obviously. We had to collaborate with the FAA.

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00:05:00,090 --> 00:05:03,820
\h This is a photograph from somebody from the FAA actually smiling.

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00:05:03,820 --> 00:05:10,480
\h We kept him happy, I managed to keep him happy and he let us do the flight.

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00:05:10,480 --> 00:05:17,380
\h We had a chase aircraft, trained chase aircraft pilots in the chase aircraft we put some of the refueling

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00:05:17,380 --> 00:05:24,960
\h equipment for the l-29 and the cameraman, and all of the associated support equipment we needed.

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00:05:24,960 --> 00:05:29,380
\h The fuel had to be prepositioned across the country of the tannery fueling stops,

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00:05:29,380 --> 00:05:33,510
\h obviously you can't call your local jet biofuel fuel truck to fuel up the

57
00:05:33,510 --> 00:05:37,880
\h airplane so we had to preposition the built.

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00:05:37,880 --> 00:05:45,120
\h Designed and built a small refueling unit so we could refuel the aircraft en route or on the ground.

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00:05:45,120 --> 00:05:52,040
\h The sponsors began a theme of collaboration, we had sponsors that we organized that went with us alo

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00:05:52,040 --> 00:05:59,230
\h way and in Leesburg the end of the project we landed, didn't really hurt ourselves or break anything,

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00:05:59,230 --> 00:06:03,410
\h and I think it was a pretty successful project overall.

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00:06:03,410 --> 00:06:06,390
\h People have described it as innovative.

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00:06:06,390 --> 00:06:13,130

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

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00:06:13,130 --> 00:06:21,270
\h I'm from a small town in England, working class northern town, an industrial revolution town.

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00:06:21,270 --> 00:06:28,280
\h As I was a child growing up, the view on the horizon from my bedroom was like this,

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00:06:28,280 --> 00:06:32,430
\h the two arrows indicate a water tower and a TV antenna,

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00:06:32,430 --> 00:06:36,390
\h which as I was a little older I walked up and actually took a look at.

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00:06:36,390 --> 00:06:37,800
\h What has this got to do with innovation?

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00:06:37,800 --> 00:06:41,550
\h I would look out of my window, see these things on the horizon and to a young

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00:06:41,550 --> 00:06:47,740
\h 5-year-old growing up in the '60s, watching the space race on TV, they were rockets.

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00:06:47,740 --> 00:06:49,470
\h They were rockets sitting on launch pads.

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00:06:49,470 --> 00:06:54,040
\h I would sit there dreaming and hoping that one day they would sprout flame and just take off.

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00:06:54,040 --> 00:06:57,140
\h I launched them many times from my bedroom.

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00:06:57,140 --> 00:07:03,580
\h Something else we had obviously growing up to watch this, we had the TV, and we had radiogram,

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00:07:03,580 --> 00:07:11,150
\h and these to me were my mission control and launch control center.

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00:07:11,150 --> 00:07:15,060
\h I was fascinated by these things, glowing screens in the night.

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00:07:15,060 --> 00:07:19,500
\h I was fascinated by what made the TV work, and when the TV broke I couldn't wait for the

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00:07:19,500 --> 00:07:23,410
\h repairman to come and fix it, I could look in the back and see what made it tick.

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00:07:23,410 --> 00:07:29,140
\h It inspired me. I went on, as I grew older, joined the royal air force and ended

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00:07:29,140 --> 00:07:34,170
\h up working in a room full of screens, darkened room, traffic control.

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00:07:34,170 --> 00:07:41,490
\h Later on instead of looking at an orange blip on the screen I became an orange blip on the screen,

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00:07:41,490 --> 00:07:44,990
\h currently an airline pilot, that's my day job.

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00:07:44,990 --> 00:07:52,030
\h I've been involved in investigative and innovative projects.

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00:07:52,030 --> 00:07:56,240
\h The ones I’m most proud of you obviously the biofuel flight.

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00:07:56,240 --> 00:08:03,590
\h I've also worked on some mag life systems and noise cancellation technology.

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00:08:03,590 --> 00:08:11,070
\h My inspiration through all of this has been other people and looking at other projects and other ideas.

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00:08:11,070 --> 00:08:18,390
\h I'm inspired to innovate by the novel approaches and successes of others, and this is what I feel it takes

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00:08:18,390 --> 00:08:23,440

\h No fear of failure, a basic understanding of science and engineering, application of the

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00:08:23,440 --> 00:08:30,200
\h Relevant principles irrespective of existing paradigms, mental effort, you've got to imagine what can be,

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00:08:30,200 --> 00:08:33,680
\h not what is, it takes physical effort of trial and error,

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00:08:33,680 --> 00:08:36,590
\h openness to criticism and confidence in your ideas.