



1  
00:00:00,000 --> 00:00:13,339  
Music and sound effects.

2  
00:00:13,374 --> 00:00:14,443  
Green propellant to me is a way to

3  
00:00:14,478 --> 00:00:16,507  
reduce the cost, the

4  
00:00:16,542 --> 00:00:17,867  
program and over all

5  
00:00:17,902 --> 00:00:19,659  
mission costs for attitude control for

6  
00:00:19,694 --> 00:00:22,123  
spacecraft because we get rid of all of

7  
00:00:22,158 --> 00:00:24,826  
the hazards and environmental

8  
00:00:24,861 --> 00:00:25,403  
dangers associated

9  
00:00:25,438 --> 00:00:26,538  
with hydrazine. One

10  
00:00:26,573 --> 00:00:27,563  
of the great benefits,

11  
00:00:27,598 --> 00:00:28,827  
performance-wise with

12  
00:00:28,862 --> 00:00:30,667  
this propellant is the

13  
00:00:30,702 --> 00:00:32,187

ISP on the engines is

14

00:00:32,222 --> 00:00:33,899

a little bit better, we

15

00:00:33,934 --> 00:00:35,130

are actually looking

16

00:00:35,165 --> 00:00:36,363

at a 40% increase in

17

00:00:36,398 --> 00:00:37,786

density ISP with it, with

18

00:00:37,821 --> 00:00:40,427

this type of propellant.

19

00:00:40,462 --> 00:00:41,403

Well with having this

20

00:00:41,438 --> 00:00:44,362

given tank volume that

21

00:00:44,397 --> 00:00:44,971

you don't want to

22

00:00:45,006 --> 00:00:46,075

change, you are getting a

23

00:00:46,110 --> 00:00:47,419

40% increase in mission

24

00:00:47,454 --> 00:00:48,507

life with the propellant

25

00:00:48,542 --> 00:00:49,259

that's in there; or

26  
00:00:49,294 --> 00:00:50,299  
you can bring down the

27  
00:00:50,334 --> 00:00:51,419  
size of the tank, put

28  
00:00:51,454 --> 00:00:52,443  
on more payload and

29  
00:00:52,478 --> 00:00:53,675  
things like that. The

30  
00:00:53,710 --> 00:00:54,843  
real area we are trying to

31  
00:00:54,878 --> 00:00:56,490  
save money in is in

32  
00:00:56,525 --> 00:00:58,362  
the loading. In a sense

33  
00:00:58,397 --> 00:00:59,483  
you can take this stuff

34  
00:00:59,518 --> 00:01:00,458  
pour it into a funnel

35  
00:01:00,493 --> 00:01:01,531  
into a tank and cap it

36  
00:01:01,566 --> 00:01:02,827  
off. Of course we won't

37  
00:01:02,862 --> 00:01:04,139  
be doing it that simply,

38  
00:01:04,174 --> 00:01:05,179

right, but you could

39

00:01:05,214 --> 00:01:05,931

do that with this

40

00:01:05,966 --> 00:01:06,843

propellant. Whereas hydrazine

41

00:01:06,878 --> 00:01:08,059

is hydroscopic, it

42

00:01:08,094 --> 00:01:09,355

will pick up moisture as

43

00:01:09,390 --> 00:01:10,427

a contaminant, this

44

00:01:10,462 --> 00:01:11,803

stuff does not do that. It

45

00:01:11,838 --> 00:01:13,116

has a broader temperature

46

00:01:13,151 --> 00:01:14,778

range, it is easier

47

00:01:14,813 --> 00:01:16,923

to employ in the

48

00:01:16,958 --> 00:01:18,219

spacecraft because you know

49

00:01:18,254 --> 00:01:19,355

you can have wider

50

00:01:19,390 --> 00:01:20,570

temperature variations and

51  
00:01:20,605 --> 00:01:21,691  
not have issues with

52  
00:01:21,726 --> 00:01:22,827  
the propellant itself.

53  
00:01:22,862 --> 00:01:24,683  
So really looking at

54  
00:01:24,718 --> 00:01:27,995  
having enhanced capability

55  
00:01:28,030 --> 00:01:30,747  
for an ESPA class or

56  
00:01:30,782 --> 00:01:32,123  
a small sat ride-share

57  
00:01:32,158 --> 00:01:33,307  
payload that comes off

58  
00:01:33,342 --> 00:01:35,499  
at that point in time in

59  
00:01:35,534 --> 00:01:37,019  
the mission. We are adding

60  
00:01:37,054 --> 00:01:38,395  
propulsive capability

61  
00:01:38,430 --> 00:01:39,835  
to that and allows a

62  
00:01:39,870 --> 00:01:40,827  
lot of other technologies

63  
00:01:40,862 --> 00:01:41,787

to be demonstrated that

64

00:01:41,822 --> 00:01:43,003  
would not otherwise be.

65

00:01:43,038 --> 00:01:44,155  
Another advantage of

66

00:01:44,190 --> 00:01:45,099  
having this is enhancing

67

00:01:45,134 --> 00:01:46,557  
the de-orbit capabilities

68

00:01:46,592 --> 00:01:48,315  
of this spacecraft,

69

00:01:48,350 --> 00:01:50,266  
you know we have a 25 year requirement,

70

00:01:50,301 --> 00:01:51,787  
well now by having this

71

00:01:51,822 --> 00:01:52,874  
propulsion system on

72

00:01:52,909 --> 00:01:54,011  
there we can potentially

73

00:01:54,046 --> 00:01:55,404  
go into higher orbits

74

00:01:55,439 --> 00:01:56,891  
and do different types of experiments

75

00:01:56,926 --> 00:01:58,283  
we couldn't have before,

76  
00:01:58,318 --> 00:01:59,771  
then bring it in and meet

77  
00:01:59,806 --> 00:02:01,467  
the 25 year de-orbit

78  
00:02:01,502 --> 00:02:03,083  
requirement for orbital

79  
00:02:03,118 --> 00:02:04,395  
debris. The costs are

80  
00:02:04,430 --> 00:02:05,595  
going to be very similar

81  
00:02:05,630 --> 00:02:06,586  
if not the exact same

82  
00:02:06,621 --> 00:02:07,626  
and we are saving a ton

83  
00:02:07,661 --> 00:02:09,562  
of money on the handling,

84  
00:02:09,597 --> 00:02:11,707  
loading of this stuff

85  
00:02:11,742 --> 00:02:12,843  
and a lot of the safety

86  
00:02:12,878 --> 00:02:13,899  
issues associated with

87  
00:02:13,934 --> 00:02:14,827  
hydrazine. Right now

88  
00:02:14,862 --> 00:02:16,283

you have to suit up in

89

00:02:16,318 --> 00:02:17,723

full bunny suits with AC

90

00:02:17,758 --> 00:02:19,451

tubes to keep the clean

91

00:02:19,486 --> 00:02:21,404

air flowing. You know

92

00:02:21,439 --> 00:02:22,427

you put on a mask here,

93

00:02:22,462 --> 00:02:23,482

like you're at the

94

00:02:23,517 --> 00:02:24,186

dentist office to make sure

95

00:02:24,221 --> 00:02:25,562

you're not getting any

96

00:02:25,597 --> 00:02:26,698

contaminants and handle

97

00:02:26,733 --> 00:02:27,787

the stuff with gloves in an open room

98

00:02:27,822 --> 00:02:30,171

environment. Lot safer.

99

00:02:30,206 --> 00:02:31,466

And the real savings would

100

00:02:31,501 --> 00:02:32,843

be getting rid of all

101  
00:02:32,878 --> 00:02:34,283  
that processing at the

102  
00:02:34,318 --> 00:02:35,403  
launch facility. Taking

103  
00:02:35,438 --> 00:02:36,683  
the propellants back,

104  
00:02:36,718 --> 00:02:37,755  
loading them at the

105  
00:02:37,790 --> 00:02:39,355  
spacecraft manufacturers

106  
00:02:39,390 --> 00:02:40,315  
and then we can ship

107  
00:02:40,350 --> 00:02:41,146  
these. We are launching

108  
00:02:41,181 --> 00:02:42,028  
in three years, right

109  
00:02:42,063 --> 00:02:42,939  
now our target vehicle

110  
00:02:42,974 --> 00:02:43,995  
is STP2. The first

111  
00:02:44,030 --> 00:02:46,171  
portion of the program is

112  
00:02:46,206 --> 00:02:47,467  
focused on the work

113  
00:02:47,502 --> 00:02:48,971

that Ball is doing with

114

00:02:49,006 --> 00:02:50,299

Aerojet, maturing the

115

00:02:50,334 --> 00:02:51,227

technology of the engines.

116

00:02:51,262 --> 00:02:52,923

Once Aerojet has completed

117

00:02:52,958 --> 00:02:54,251

development of this

118

00:02:54,286 --> 00:02:55,387

technology, which

119

00:02:55,422 --> 00:02:57,195

includes tanks, valves and

120

00:02:57,230 --> 00:02:58,379

thrusters, they are

121

00:02:58,414 --> 00:03:01,146

going to build that up as

122

00:03:01,181 --> 00:03:03,003

a payload assembly.

123

00:03:03,038 --> 00:03:03,930

Ball gets integrated, we

124

00:03:03,965 --> 00:03:04,811

do the environmental

125

00:03:04,846 --> 00:03:05,979

testing and final checkout

126

00:03:06,014 --> 00:03:08,123

at Ball. If we can

127

00:03:08,158 --> 00:03:09,371

really pull it off, we

128

00:03:09,406 --> 00:03:10,443

will fuel it up at Ball,

129

00:03:10,478 --> 00:03:11,947

then we will ship it