

Future NASA rocket to be most powerful ever built (Update)

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This artist concept provided by NASA shows the launch of the rocket design, called the Space Launch System. The design for NASA's newest behemoth of a rocket harkens back to the giant workhorse liquid rockets that propelled men to the moon. But this time the destinations will be much farther and the rocket even more powerful. (AP Photo/NASA)

To soar far away from Earth and even beyond the moon, NASA has dreamed up the world's most powerful rocket, a behemoth that borrows from the workhorse liquid rockets that sent Apollo missions into space

four decades ago.

NASA Administrator Charles Bolden and several members of Congress joined Wednesday in unveiling the Obama administration's much-delayed general plans for its rocket design, called the Space Launch System. The multibillion-dollar program will carry astronauts in a capsule on top, but the first mission would be 10 years off if all goes as planned. Unmanned test launches are expected from Cape Canaveral, Fla., in six years.

Calling it the "largest, most powerful rocket built," NASA's exploration and operations chief, William Gerstenmaier, said the rocket will be tough to construct. But when NASA does it "we'll have a capability to go beyond low-Earth orbit like no other nation does here on Earth," he said in a telephone briefing Wednesday.

Even the smallest early prototype of the rocket will have 10 percent more thrust than the Saturn V that propelled Apollo astronauts to the moon. When it is built to its fuller size, it will be 20 percent more powerful, Gerstenmaier said.

Sen. Bill Nelson, D-Fla., noted the economic challenges the nation faces even as NASA maps plans for a rocket system some estimate at \$35 billion.

"Will it be tough times going forward? Of course it is," Nelson said in a separate news conference. "We are in an era in which we have to do more with less - all across the board - and the competition for the available dollars will be fierce. But what we have here now are the realistic costs" verified by independent experts.

Nelson puts the cost of the program at about \$18 billion over the next

five years. But that estimate is mostly for development and design through the first test flight in 2017, and doesn't include production of later rockets, Gerstenmaier said. Gerstenmaier wouldn't give a total estimate, but a knowledgeable administration source has put it about almost double that.

The size, shape and heavier reliance on liquid fuel as opposed to solid rocket boosters is much closer to Apollo than the recently retired space shuttles, which were winged, reusable ships that sat on top of a giant liquid fuel tank, with twin solid rocket boosters providing most of the power. It's also a shift in emphasis from the moon-based, solid-rocket-oriented plans proposed by the George W. Bush administration.



This artist's conception released by NASA shows the Space Launch System -- an advanced heavy-lift launch vehicle that will provide an entirely new national capability for human exploration beyond Earth's orbit.

"It's back to the future with a reliable liquid technology," said Stanford University professor Scott Hubbard, a former NASA senior manager who was on the board that investigated the 2003 space shuttle Columbia accident.

NASA figures it will be building and launching about one rocket a year for about 15 years or more in the 2020s and 2030s, according to senior administration officials who spoke on the condition of anonymity because they were not authorized to make the announcement. The idea is to launch its first unmanned test flight in 2017 with the first crew flying in 2021 and astronauts heading to a nearby asteroid in 2025, the officials said. From there, NASA hopes to send the rocket and astronauts to Mars - at first just to circle, but then later landing on the Red Planet - in the 2030s.

At first, the rockets will be able to carry into space 77 to 110 tons, which would include the six-person Orion Multi-Purpose Crew Vehicle capsule and more. Eventually it will be able to carry 143 tons into space, maybe even 165 tons, the officials said. By comparison, the long-dormant Saturn V booster that sent men to the moon was able to lift 130 tons.

The plans dwarf the rumbling liftoff power of the space shuttle, which could haul just 27 tons. The biggest current unmanned rocket can carry about 25 tons.

The plans elicited an amazed "good grief" from Hubbard, who said it would limit how often they could be built or launched. Unlike the reusable shuttle, these rockets are mostly one-and-done, with new ones built for every launch.

Some of the design elements, the deadline and the requirement for such a rocket were dictated by Congress.

While the recently retired space shuttle's main engines were fueled by liquid hydrogen and liquid oxygen, it was primarily powered into orbit by solid rockets. Solid rocket boosters were designed to be cheaper, but a booster flaw caused the fatal space shuttle Challenger accident in 1986. The biggest drawback was that solid rockets can't be stopped once they

are lit; liquid ones can.

The new plan is to use a giant rocket powered by liquid hydrogen and liquid oxygen. Apollo, Gemini and Mercury flew into space on liquid rockets, and liquids fuel most of the world's unmanned commercial rockets. Russia's Soyuz rocket is liquid fueled too.

During its initial test flights the rocket will use five solid rocket boosters designed for the shuttle strapped on its outside and will have shuttle main engines powering it on the inside. But soon after that the solid rocket boosters will be replaced with new boosters that should have new technology and may be either liquid or solid, the officials said

The key financial part of this arrangement is that NASA hopes to save money by turning over the launching of astronauts to the International Space Station, which orbits the Earth, to private companies and just rent spaces for astronauts like a giant taxi service. NASA would then spend the money on leaving Earth's orbit and the Earth-moon system.

Hubbard worries that NASA has a history of spending far more than initially proposed - the space shuttle cost about twice what it was supposed to - and this new rocket system will drain money from other NASA missions.

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