Is the NRC Ready for Reform?

Critics from within and outside the National Research Council say it needs to become leaner, more responsive, and more open. Can the 81-year-old institution learn new tricks?

All seemed calm and collegial last month at the National Academy of Sciences' (NAS's) garden party, where the cream of the U.S. research establishment gathered under a big white tent as part of the organization's annual meeting. What was not visible amid the wine and hors d'oeuvres, however, were the serious strains afflicting the venerable private institution, which is both honor society and hard-working adviser to the government.

Those strains are particularly evident in the workings of the National Research Council (NRC)—the operating arm of the NAS, the National Academy of Engineering (NAE), and the Institute of Medicine (IOM)—which conducts studies primarily on behalf of federal agencies. Under the pressure of lawsuits, a stagnant budget, and internal dissent, academy managers are seeking ways to remodel a conservative research organization that takes pride in its slow, deliberative pace.

Critics inside and outside the academy agree that changing the way the council does business, although necessary, will be no garden party. The council, they say, takes too long to deliver its reports, operates too secretively, and is too bureaucratic to cope with a government bent on cutting costs. "It's in a little bit of a stressed position," says M.R.C. Greenwood, chancellor of the University of California (UC), Santa Cruz, and past chair of a major NRC panel. "In the past couple of years, there has been more pressure [for the council] to move faster, be more efficient, and be more directed in its recommendations."

Some academy members are more alarmed, citing a combination of fiscal and legal challenges that poses major dangers for the council. "A vocal minority thinks things are really off track," says one of those members. And one concern of that group—a new NAS poll of members familiar with the NRC found that 10% were dissatisfied with how it operates—is that managerial overhead remains high, even though federal revenues have declined from a 1992 peak of $167 million. There is also fear that recent court rulings siding with critics of two NRC studies—one recommending new guidelines on animal care, and the other analyzing the merits of a large laser-fusion project—could, if upheld, force the council to open up its deliberations and alter its process of selecting experts and reaching conclusions. "It would eliminate the academy's independence, which is critical for our credibility," says William Colglazier, the council's executive officer.

Academy President and NRC Chair Bruce Alberts agrees on the need for reform, but says that the council's broad audience and the diverse views of academy members preclude a rapid makeover. "It's tough to change the culture," he says. In addition, Alberts and his colleagues in the marbled building across from the Mall in downtown Washington are still recovering from a nasty internecine battle that led to the ouster of Harold Liebowitz, who was elected NAE president in 1995 and then recalled last spring.

Dealing with these crises has left the council's management with little time to plot a clear, strategic vision as it enters a new century, some members say. And that could be dangerous. "If it is no longer useful to the federal government, [the council] will disappear," says Harvard University physicist Richard Goody, a longtime NAS member.

NRC AT A GLANCE

Founded: 1916

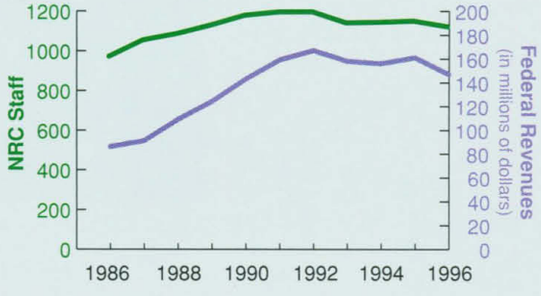
Annual Budget: $176 million

Total Staff: 1123

Avg. Number of Study Groups: 700

Avg. Number of Annual Studies: 200

Avg. % of IOM, NAS, NAE members on NRC panels: 5.8%



Belt-tightening times. Federal revenues, and the staffing levels needed to do the work, have dipped in recent years as the government tries to erase a budget deficit.

SOURCE: NRC

A voluntary "monstrosity"

No one seriously suggests that the NRC is likely to go the way of the Office of Technology Assessment, the congressional think tank disbanded in 1995 by Republicans bent on shrinking the federal government. NAS's 1863 charter, signed by President Abraham Lincoln, gives it a unique corner on the market of providing technical and scientific advice to the government. That expertise comes not from a small staff of paid experts, but from thousands of U.S. scientists and engineers—the vast majority of whom are not members of the science and engineering academies or the IOM—who each year answer the NRC's call to donate their time to serve on committees. The result is a widespread reputation for independence and balance unmatched by other institutions. It's a system that other countries, most recently Germany and Mexico, want to emulate as a model for providing impartial scientific advice to their governments.

But those strengths can also be weaknesses. A reliance on busy volunteers, for example, makes it hard to respond quickly to government requests in an increasingly fast-paced world. And the procedures designed to ensure balance and accuracy in studies add layers of bureaucracy to the process. "Everything gets watered down so much," complains one congressional aide. "It's a big, iterative monstrosity," adds a former NRC staffer.

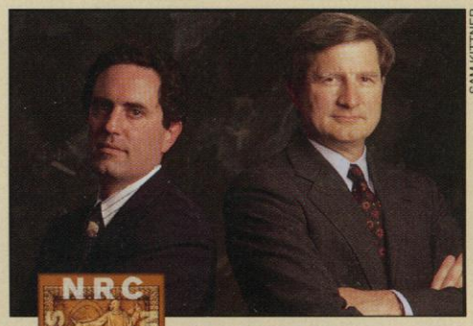
Indeed, hundreds of studies are winding their way through the NRC at any given moment. A typical study takes 18 months and costs about $250,000—far longer and more expensive than comparable reports conducted by private think tanks or consulting firms (*Science*, 6 October 1995, p. 23). Academy officials say the results are worth the extra time and money. What the customer receives, they say, is frequently considered the definitive word on an issue.

Most of those studies are relatively prosaic, from the technical capabilities of the F-22 fighter plane to the efficacy of waterproofing membranes on concrete bridge decks. But a few exert a profound influence on the way the government and the public view an issue. A

Two Strategies for Dealing With Dissent

For physicist Tom Cochran, the way the National Research Council (NRC) selects outside scientists and engineers for its study panels smacks of good-old-boy networks and back-room deals. In fact, his organization, the Natural Resources Defense Council, has sued the Department of Energy (DOE)—the NRC's client—over the composition of a group formed last year to look at the proposed $1.2 billion National Ignition Facility (NIF) at Lawrence Livermore National Laboratory in California. The report from the panel, which Cochran says was biased, endorsed NIF as technically sound.

A federal court is weighing a response from DOE and NRC officials to its recent ruling that the report cannot be used in deciding whether to proceed with NIF. In the future, however, the council might avoid such confrontations through the time-honored tactic of bringing potential critics into the process. Take the case of Steven Aftergood, an analyst with the Federation of American Scientists and a gadfly on military and secrecy issues. Aftergood was recently appointed to an NRC board, and he says he now views the council's inner workings in a more favorable light than he did as an outside critic. Although he still believes that "committee members tend to ... have some common set of prejudices," he has been impressed with the concern shown to questions of bias and conflicts of interest.



SAM KITTNER

Both sides now. Steve Aftergood *(left)* sees the NRC process from the inside, while outsider Tom Cochran pushes for change.

Such quiet attempts by the NRC to reach a more diverse community appear to be paying off, despite fears that involving outsiders could disrupt study panels and water down their technical expertise. In recent years, the council has added politicians and interest-group representatives to boards and study panels that traditionally were filled only with establishment researchers. "We try to get all points of view," says NRC Chair Bruce Alberts. But he adds that the council is not willing to accommodate those who are unwilling to compromise.

The NIF saga demonstrates that the middle ground can be hard to find. Cochran maintains that Energy wanted a sweeping evaluation of NIF, while NRC officials envisioned a narrow, technical study. "From a technical standpoint, the panel is superb—they are the finest scientists in the country," says Cochran. "But that's not the issue." He counts seven of the 16 members as either paid Livermore consultants or Livermore advisers on the NIF project. Additional members received free time on a Livermore laser, coauthored papers with Livermore scientists, or had other connections to Livermore, Cochran maintains: "I don't see how these guys conclude this was balanced."

NRC officials argue that the technical nature of the study required experts, and that those experts needed to be familiar with the inertial confinement fusion program of which NIF is a part. "Anyone with the requisite knowledge and expertise in many of these narrow fields ... will have some connection to or collaboration with a national lab," states Dorothy Zolandz, the chief NRC staffer who oversaw the NIF report, in a declaration to the U.S. District Court in Washington. William Colglazier, the NRC's executive officer, admits there were no NIF opponents on the committee, but says "We tried to make sure we had a couple of reviewers who were more critical of NIF." Privately, however, some NRC officials say they are unhappy with the selection process for the study. "It was a sloppy job," says one NRC source.

The NIF study isn't the only legal challenge to how the council forms its panels. The Animal Legal Defense Fund has successfully challenged the composition of a panel that studied the care of animals in research. However, the council has tried in other situations to reach out to the animal-rights community. For example, Peter Theran, a veterinarian at the Massachusetts Society for the Prevention of Cruelty to Animals, sits on an NRC panel examining the care of chimpanzees used in research, and three of the panel's four sessions were open to the public. "It's been very constructive, and it has allowed a candid dialogue," Theran says about the open sessions. He also applauded the panel's review of the biases that each member brings to the table. This review took place at its first meeting, which was closed.

Expanding the council's diversity by including critics like Theran and Aftergood appears to have eased suspicions about the influences on panel members. Were he not a member of the NRC's Aeronautics and Space Engineering Board, Aftergood admits, he might have questioned the impartiality of its chair, Boeing executive John Warner, because Boeing is the world's leading builder of aircraft and has a huge stake in the U.S. space program. But Aftergood says personal contact has laid to rest his concerns about bias: "He's a great guy, and I have not detected anything improper in his conduct." So the council's best protection against criticism of its actions may be to open its doors and let critics see for themselves. –A.L.

seminal 1986 study is a case in point. With the Reagan Administration shying away from a major commitment to AIDS research, the council used its own endowment money to conduct the first comprehensive study of the controversial disease. The report helped prod the government into action.

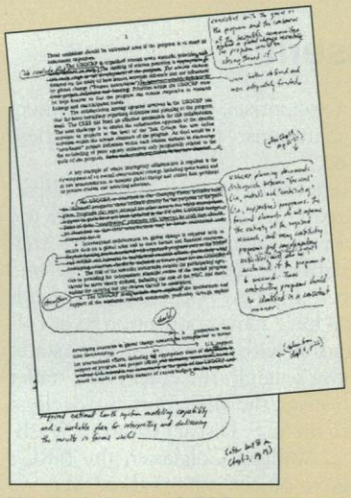
Open season?

Such studies have forged the NRC's reputation for independence. To preserve that quality, say academy managers, the council must operate largely in secret to prevent government, industry, or interest groups from influencing results. That assumption, however, is under legal attack by those who say secrecy can mask bias and conflicts of interest in NRC study panels.

The two recent lawsuits, for example, were brought by animal-rights and environmental groups arguing that the academy's claim of independence and balance is a fig leaf masking an impenetrable, good-old-boy network. "The NRC and the National Institutes of Health [NIH] are so close, each knows when the other is breathing and what the other is thinking," complains Valerie Stanley, the staff attorney for the Animal Legal Defense Fund, which objects to the way the council came up with new animal-care provisions under contract with NIH. The group argues that the panel was biased in favor of animal use and lacked adequate voices for animal protection.

Such attacks are not new. "Charges of bias are almost unavoidable" given the number of studies, says Robert White, former NAE president and NRC vice chair, who dismisses most of them as cases of sour grapes. "If you don't like the outcome, the best thing

NRC Alters Report After Complaints



Marginal changes? EOS report was revised after meeting with federal officials.

The National Research Council (NRC) prides itself on its independence from the federal agencies it advises. As one longtime NRC staffer puts it, "Independence is the coin of the realm" that gives the council a large measure of credibility. However, an incident took place in 1990 that appears to be an exception to that rule. In that case, according to interviews and documents obtained by *Science*, top NRC management and a study-panel chair toned down the executive summary of a controversial report after White House and other government officials complained that it was inaccurate and unduly negative.

The report, requested by then–presidential science adviser Allan Bromley, raised questions about the design of the centerpiece of the U.S. global-change research program, NASA's proposed $30 billion Earth Observing System (EOS). A series of massive spacecraft, EOS was under fire from lawmakers and researchers for its cost and complexity, and government sources say supporters feared further damage from a critical NRC report.

The incident began, according to an NRC memo dated 16 August 1990 that was sent to panel members, with a 13 August phone call from Bromley to Robert White, then National Academy of Engineering president and vice chair of the council. A copy of the $136,000 report, complete but not yet printed, had been leaked to a government official, and Bromley, according to the memo, told White that there appeared to be factual errors in the executive summary. Bromley asked for a meeting at which government officials could express their concerns.

While agency officials are routinely shown a copy of a final report before it is released, staffers and volunteers say it is highly unusual for senior agency and NRC managers to discuss an unpublished report. "In my 23 years here, it's the only example I can think of," says senior NRC staffer Myron Uman, who wrote the memo. White says he does not recall the incident, and Bromley disputes Uman's description of events in the memo: "That's not what happened." Rather, Bromley says, he called White to complain about the cover letter that typically accompanies a published study, not the executive summary, and that he never saw the report until it was printed.

The day after the phone call, the memo explains, a group of agency managers gathered at NRC headquarters with White, NRC executive officer Phil Smith, and the chair of the study panel, James Baker, an oceanographer who now directs the National Oceanic and Atmospheric Administration. Agency representatives for the global-change program were furious, according to NRC sources. The executive summary, often the only portion of a report read by policy-makers, was more negative than the full report, the agency officials said. The group reviewed the summary line by line, according to NRC sources.

White and Smith say they do not remember the meeting, and Baker declined to comment. But Uman's memo says the three concluded that "some changes" to the summary were needed, and a series of handwritten edits were made that day to the already-typeset summary. The NRC's report review committee, which must sign off on all reports released from the council, approved those changes, Uman said in a recent interview.

Most of the nearly two dozen changes, although minor, recast NASA's activities in a more positive light. For example, the phrase "NASA needs a contingency plan in the event of failures" was altered to "NASA needs a more thorough contingency plan in the event of failures." A phrase noting that the EOS data system "must be an evolving entity" was changed to say it "is planned as and must be an evolving entity."

In explaining to panel members why the report was delayed, Uman's memo plays down what was altered. "The only changes made were intended to improve the summary as a digest of the text. ... The NRC does not permit prior review of its reports by sponsoring or affected agencies, except to assure that factual statements about agency programs are accurate."

A pamphlet for NRC volunteers, entitled "Getting to Know the Committee Process," spells out that policy. It explains that "early briefings damage the final report by subjecting the committee to the accusation that it permitted the sponsor to preview and approve the conclusions and recommendations—a serious charge that undermines the independence and integrity of both the committee and the institution."

Indeed, the council's integrity appears to have suffered from the incident. Following the report's release, the White House National Space Council set up its own study panel to examine the size of EOS platforms, recalls one former Administration official, because of doubts that the NRC could withstand agency pressure. The space-council staff, the official says, was "pissed because [the NRC] watered it down. They caved in to the agencies."

Frank Press, former NRC chair and president of the National Academy of Sciences, doesn't agree. He says he "would have stopped" any "substantive" changes. But Uman, at least, was sufficiently worried about how the incident might be interpreted to counsel silence on the matter. "We would appreciate it," his memo states, "if you would not discuss the recent events." The report makes no mention of any last-minute changes. **–A.L.**

to do is attack the process," says IOM President Ken Shine.

Yet, there have been instances in its 81-year history in which the council has buckled to government pressure (see above) or produced flawed reports. Some of the worst examples took place in the 1960s and early 1970s, and were detailed by *New York Times* reporter Philip Boffey in his book, *The Brain Bank of America*. The council at the time undertook a series of reforms aimed at minimizing the influence of industry and government on its studies. Panel members now are required to detail financial conflicts of interest, and to discuss their biases at the first committee meeting. New layers of committees and commissions review the makeup of panels and the results of their work.

Although these changes dramatically improved the overall quality and credibility of reports, say many familiar with the council, they did not lead to greater public access. How and whether the system of checks and balances works as described in NRC pamphlets remains largely unknown outside the academy complex. Conflict-of-interest forms and the bias discussions are kept secret, as are study-panel deliberations and the review of reports by an internal committee. "People have to take it on faith," admits NAE President William Wulf.

This secrecy is possible because the council claims immunity from the Federal Advisory Committee Act (FACA), a 1972 law that forced federal agencies to be more forthcoming about the outside advice they receive. Under FACA, advisory panels must conduct most of their meetings in the open and make public any documents they use.

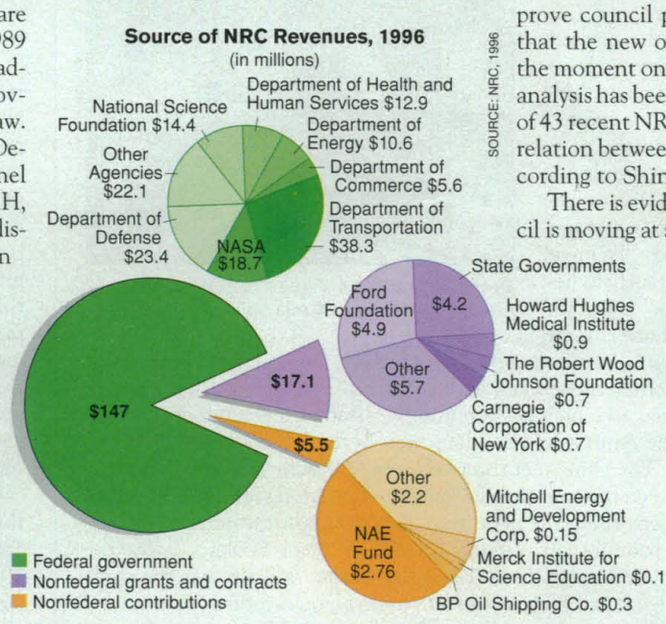
Although numerous past challenges to force the council to open up have failed, the tide may be turning. In January, the U.S. Court of Appeals for the District of Columbia ruled that the NRC panel on animal care should have abided by FACA, citing a 1989 Supreme Court case that refers to the academy as an example of the type of quasi-government organization covered by the law. The suit brought by the Animal Legal Defense Fund maintained that the study panel included too many scientists funded by NIH, its sponsor. Two months later, a federal district judge in Washington, D.C., ruled in favor of three environmental groups, saying that the Department of Energy could not use an NRC report because the study panel operated behind closed doors (see sidebar on p. 901).

These latest threats to the council's tradition of secrecy have almost wholly absorbed the attention of NRC managers. Abiding by FACA, say Colglazier and others at the council, would require NRC's customers to play a major role in organizing and participating in meetings, selecting members, and setting agendas. Agency officials, for example, would be required to submit meeting notices to the *Federal Register*, because NRC officials are not government employees. Some outside scientists also worry that FACA rules would stifle internal debate: Panel members might be reluctant to discuss contentious issues with industry, government officials, and the media present. "It will screw up the whole process," says UC Santa Cruz's Greenwood. "Abiding by FACA would be a huge impediment."

For some, the real concern is extra paperwork. "FACA is a bureaucratic nightmare, and it would create a very complex paper trail with a huge cost," says one former NRC staffer. Others say the threat of public financial disclosures would turn off volunteers. "People are reluctant to say in front of reporters that they own 1000 shares of Motorola stock," says Alberts.

A diverse chorus of researchers and interest-group representatives agrees that abiding by FACA poses certain problems, but they say the advantages outweigh the risks. "Would it be disastrous? Not at all," says Yale University physicist and former presidential science adviser Allan Bromley. "Although it makes life a little more complicated, it also makes people happier with the results." Adds one former NRC staffer: "It would give them a greater sense of credibility. The secrecy of the NRC process tends to make people nervous." And several NAE and NAS members told *Science* that they would have no problem releasing private financial information. "It would be best to be up front about it," says Anthony England, a University of Michigan geophysicist and member of an NRC board.

Academy leaders admit that greater openness would reduce worries about bias, although there's no consensus in the organization on how far to go. "We're trying to push toward more openness," says Alberts. "I think it's in all our interests [because] people will understand us better." The FACA flap, adds NAE's Wulf, "will set off a series of changes in the NRC that are probably for the good." But for now, there is more bunker mentality than free thinking on the subject. Academy managers have spent more than a year debating a new policy that would, for example, make informational committee meetings open. Paradoxically, that policy is on hold as managers deal with the FACA threat.



Brain food. The federal government provides by far the largest slice of the NRC's operating budget.

Serving the customer

A less dramatic, but no less serious, challenge to the council comes from its clients. Tight federal budgets and the push to reinvent government already are altering the complicated relationship. "We're a more critical consumer of what the academy has to offer," says one agency manager. "A half-million-dollar contract wasn't noticeable a few years ago, but it is now."

Agencies are also becoming less willing to wait several years for a report's conclusions. "The era of multiyear, multi-hundreds-of-pages[-long] studies is over," says Steven Aftergood, an analyst for the Federation of American Scientists and member of an NRC board. "They are too expensive, too slow, and too often not worth the cost or the trouble." Adds one former NRC official: "A lot of reports are terribly written, irrelevant, and don't matter much—but where else can [customers] go?"

Ironically, the council has done little research on the speed, cost, quality, and impact of reports and their correlation to one another. At the urging of an internal council group, Alberts recently set up the Office of Institutional Research to evaluate and improve council programs—although he adds that the new office's director is focused for the moment on the FACA issue. What little analysis has been done is surprising: A review of 43 recent NRC/IOM studies found no correlation between speed, cost, and impact, according to Shine.

There is evidence, however, that the council is moving at a faster clip in producing studies. The average NRC/IOM study, for example, takes less than 12 months now, compared with 18 to 24 months just a few years ago, Shine says. "They are doing a lot better than they used to," says James Baker, an oceanographer who served on many NRC panels and now directs the National Oceanic and Atmospheric Administration. "But there's still a tendency for the system to be slow." And the longer a report takes, the more it costs.

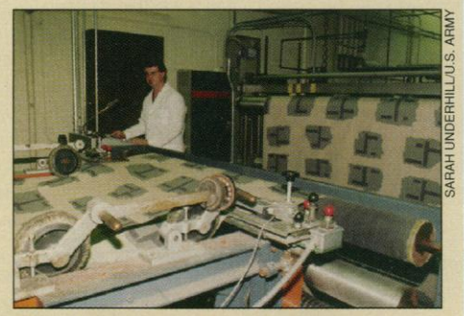
And cost is much on the minds of federal managers such as Baker. Federal belt tightening has led some agencies to put the council on a shorter financial leash. In the past, for example, NASA allotted core funding to two boards, which had great flexibility to choose their topics. Now the contracts are based solely on specific tasks. "NASA's procurement officers now have carte blanche to treat the academy like any Beltway bandit," sniffs one NRC official, referring to the horde of private companies that live off government contracts. Task orders also make it harder for panels to conduct studies that NASA officials might not want, says Colglazier.

"Lots of large egos"

The new fiscal reality—flat budgets, perhaps not even protected against inflation, and stretching far into the future—contrasts with the sunnier era of the 1980s, when the federal government's funding of the council grew steadily. After peaking in 1992 at $167 million, however, annual federal revenues have declined to $147 million, while funding from other sources (such as industry) has remained steady at about $21 million. Al-

The High Price of Being World Class

What is world-class research? That's what the Army's Natick Research, Development and Engineering Center in Massachusetts asked the National Research Council (NRC) as part of an effort to reinvent itself. One year and $302,290 later, a prestigious NRC panel concluded that "if the phrase 'world-class' is to be useful as a vision, it must be defined, tailored, and characterized." A definitive answer on how to become world class, it turns out, will cost the Army another $227,840—the price of a second study to assess Natick's R&D abilities.


SARAH UNDERHILL/U.S. ARMY

Dress for success. Army's Natick lab tests new designs for urban camouflage.

Is this a good use of the council? National Academy of Sciences President Bruce Alberts doesn't really think so, but he says his options are limited. "It's not something I would choose to do, but we have to say yes unless it doesn't make sense," says Alberts, who also chairs the NRC. "We have to respond when asked," he adds. "I'd prefer to be doing [more important] studies, but you can't win them all."

The academy has a charter to advise the government, and it is often called on to do narrowly focused studies of interest to a single agency. Such studies, however, add to the NRC's overhead. The Natick study, for example, required a 12-member committee, a staff of seven—four from the council and three from the Army—and one liaison from the NRC's Board on Army Science and Technology. The panel met three times in Massachusetts and Washington, and the report had to go through the academy's extensive review process before coming to vague conclusions about the definition of world-class research.

Army officials and the panel's chair, Virginia consultant Joseph Soukup, defend the report as a necessary exercise for a military lab in transition. Soukup says the study generated the metrics needed for a report now under way on Natick's future. A consulting company dependent on Army contracts could not have been as objective, he adds.

It is possible for the council to say no to the government, as when it told the Department of Health and Human Services that it would not draw up clinical guidelines for individual diseases. But those occasions are rare; typically, the council asks an agency to recast its proposal to fit the scope of one of its study panels. Still, many NRC officials think that the council must become more selective. "The balance is shifting toward issues with a policy impact," says one senior NRC official. "We're being directed [by academy management] toward bigger and more tangled technical and scientific matters."

To make such a shift, however, the NRC's numerous committees, boards, and commissions must be weaned from what some academy members see as a craving for more work. "Every member harbors a suspicion that some studies are put together for continued cash flow," says Yale University physicist Allan Bromley, a former presidential science adviser.

Top NRC officials share that concern. If the council does not become more selective in its choice of assignments, they say, it could jeopardize its own reputation as a world-class research organization.

–A.L.

though staffing has fallen slightly from a peak in the early 1990s, the decline may not be enough to satisfy the accountants. And while government auditors have pushed down overhead charges for universities since the scandals of the late 1980s, the NRC rate applied to salaries and benefits remains where it was a decade ago, at 63%.

NRC officials do not believe that their financial sky is falling, however. "The market test is that people keep asking us to do more work," says Chief Operating Officer Sue Woolsey, who adds that budget size is "not a particularly important measure" for a nonprofit organization. Alberts agrees. "I wouldn't be upset at all if this were a smaller organization, as long as it was doing important work," he says. "It would be an easier place to manage."

And managing the council is no easy task. "You have a staff of Ph.D.s, many clients, and 10,000 consultants with lots of large egos," says one NAS member. Study panels are overseen by boards that are overseen by commissions, which report to the council chair.

In a blunt assessment of the NRC's state as he left office in 1995, White said the organization's chain of command was "confusing and obscure." To slice costs and speed up the study process, he called for "a fundamental restructuring and streamlining," to include clustering related boards into a division, and elimination of "two costly layers of volunteer management"—the commissions and the report-review committees. Although White still believes the changes are important, none has been implemented.

Alberts's view of reform is less ambitious. Although he agrees that "the commissions aren't working as well as they should," he says he does not foresee wholesale restructuring of the organization. For example, he cites recent decisions to contract out food services and landscaping duties as signs of the "tremendous changes" in the council's operations. "We're always looking for ways to be more efficient," he adds. To some NRC officials, academy members, and volunteers, however, such changes fail to address the fundamental problems facing the organization. Alberts admits that his collegial style of management may be a hindrance in seeking more rapid and dramatic changes. "Where I've failed is in not being insistent enough about change," he says. "I'm basically a university person—I like to get people to change by convincing them to change."

Yet even a corporate-style manager might find it hard to set the NRC staff, volunteers, and academy members on a common course. Volunteers worry that proposals to give more authority to members would, in the words of one, "install the mandarins." And staff members are sensitive to charges—made frequently by Harold Liebowitz—that they are feathering their own nests by encouraging unnecessary studies. Apathy is another obstacle. The results of a member survey released last week, for example, show that only half are familiar with how the council works.

Alberts, who told *Science* he might consider seeking reelection when his current 6-year term ends in 1999, says his greatest challenge is convincing volunteers and members of the need for change: "You cannot control volunteers. We have no leverage over them except persuasion." And convincing them that major reform is needed is a tall order. But some observers don't see an alternative to cope with a more diverse, budget-conscious, and fast-paced society. The status quo, they say, puts the council at risk of becoming an increasingly irrelevant think tank attached to a prestigious society made up primarily of elderly, white, and male scientists and engineers. "There was a time when that demographic group could speak with authority on anything," says one agency manager who deals with the council. "But that is no longer the case." The challenge for NRC officials is finding a new voice to speak to a changing world.

–Andrew Lawler