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Committee on Natural Resources Committee
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Examining Deficiencies in Transparency at the Department of the Interior
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Chairman Lamborn, Ranking Member Lowenthal, and Members of the Subcommittee, thank you for the opportunity to testify today concerning the lack of transparency problems with respect to the scientific and economic information federal agencies rely upon, and what Congress could do to improve it. My testimony concerns regulatory agencies in general, not necessarily the Department of the Interior.

I. BACKGROUND

From 1988 through 1998, I held a career position as an economist in the Office of Information and Regulatory Affairs ("OIRA"), the statutory office within the Office of Management and Budget ("OMB") created by the Paperwork Reduction Act of 1980 ("PRA"). During my decade in OIRA, I reviewed dozens of major regulations and their supporting analyses, reviewed agency Information Collection Requests involving environmental epidemiology and exposure assessment, and drafted numerous work products on behalf of OIRA and OMB. I have been an independent consultant since 2001 serving a variety of clients in matters related to benefit-cost analysis, risk assessment, information quality and PRA compliance. I do not lobby.

Transparency is a disequilibrium state of affairs in regulatory decision-making. Extraordinary effort is required to achieve transparency, and these efforts must be sustained over time. Also, they must adapt to changing circumstances; agencies seem to devote substantial effort to neutralize reforms intended to achieve greater transparency.

I will focus on the *transparency* and *reproducibility* of scientific and economic *information*, as that term is defined by OMB (5 C.F.R. § 1320.3(h)) and OMB's Information Quality Act ("IQA") guidelines (67 Fed. Reg. 8760). *Transparency* describes a state in which all relevant information is publicly disclosed, and *reproducibility* is the minimum evidence needed to ensure that transparency has been achieved.

II. WHERE DOES SCIENTIFIC AND ECONOMIC INFORMATION COME FROM?

Leaving aside formalized requests for information from the public, such as through Advanced Notices of Proposed Rulemaking, there are three broad pathways through which agencies obtain use to obtain scientific and economic information.

First, agencies may obtain information from the public domain. This includes articles published in peer-reviewed journals or so-called "gray literature." Second, agencies may generate information on their own, utilizing their own staff or hired consultants. Third, agencies may seek information from the public through formal

Information Collection Requests ("ICRs") subject to the procedural and substantive requirements of the PRA. Agencies often use a hybrid model by sponsoring the collection of information by others, such as consultants or university professors, to collect data and conduct analysis on their behalf. Sponsored collections of information also are subject to the PRA. (There is another hybrid model, one that ought to be controversial: contracting with a sister agency to "rent" the latter's statutory authority to require the public to provide information.)

III. IS SCIENTIFIC AND ECONOMIC INFORMATION TRANSPARENT IN THE WILD?

The simple answer is, "No." Transparency is an expensive public good. Each information pathway is thus afflicted, in different ways, by a lack of transparency.

A. Scientific and economic information in scholarly journals is nontransparent and probably riddled with false positive reports.

Peer-reviewed journal articles are terse. This is a standard form, a vestige of the pre-Internet days when journal pages were physically limited. Oftentimes years of research by teams of scientists, copious laboratory notes, and reams of statistical analysis are compressed into just a few dense pages. A lot of pertinent information is thus excluded, including data. Authors report what they and their editors want readers to see.

Data disclosure is a quintessential element of transparency, but it is a rare (though growing) feature among peer-reviewed journals. Some highly regarded journals require authors to make their data publicly available (e.g., the American Association for the Advancement of Science, publisher of *Science* and three other journals (http://bit.ly/1V4A0Bl); the Nature Publishing Group, publisher of *Nature* and dozens of other journals (http://bit.ly/1OuJSO8); and the American Economic Association, publisher of the *American Economic Review* and six other journals (http://bit.ly/2537tT2). Other highly regarded peer-reviewed journals do not require data disclosure (e.g., the Centers for Disease Control and Prevention, publisher of *Morbidity and Mortality Weekly Report*; and the National Institute of Environmental Health Sciences, publisher of *Environmental Health Perspectives*). Scholars vary, too. Those who do not want to disclose their data publish in journals that do not require disclosure.

Transparency is often misused as proxy for quality—or worse, objectivity. Contrary to OMB's information quality guidelines (67 Fed. Reg. 8454), journal publication should not be accorded any presumption of objectivity. Journals have many purposes, often including policy advocacy, that are at least in conflict (if not incompatible) with objectivity. Empirical journals are strongly biased in favor of statistically significant results. Nonsignificant results aren't interesting, so studies that do not report statistical significance are less likely to be published. This incentivizes scholars to design their analyses with statistical significance in mind, or perform enough analyses to find something statistically significant. In a famous 2005 paper published in *PLoS Medicine* (http://bit.ly/1sfUlrH), Stanford University professor John Ioannidis showed that most published research findings are false—that is, authors routinely report spurious correlations as if they were statistically significant effects, *even if they have done nothing intentional to impart bias.* (When authors display intentional bias, all bets are off.)

Further confirmation of this problem is provided by a 2015 study in *Science* authored by the Open Science Collaboration (http://bit.ly/1TfNghK), which attempted to replicate 100 studies published in three major psychology journals. Statistically significant associations had been reported in 97% of the original studies, but statistical significance could be replicated in only 36% of them. Half of the original studies that were successfully replicated had effect sizes outside the 95% confidence intervals of the original studies. Both results are clear indicators of unreliability.

As the public and its institutions have become more reliant on science, economic theory predicts that the average quality of published science would decline. In recent years there has been phenomenal growth in the sheer number of journals. While it is possible that demand has grown because of a genuine increase in the supply of high-quality scholarship, other reasons seem more likely. More likely, the total supply of manuscripts has increased much faster than the supply of the high-quality subset.

Even among journals whose missions are not policy-driven, journals that used to limit themselves to science have strayed into policy. Their scientific integrity is compromised because one cannot tell where science ends and policy begins. Predatory journals exist only to profit on the publication of low-quality research. These journals conduct little or no actual peer review, promise extraordinarily quick turnaround, and charge substantial sums in the form of "article processing charges." Lists of predatory journals are publicly available; see, e.g. *Beall's List* (http://bit.ly/1Q3DIIw).

In short, readers of peer-reviewed studies (and especially regulatory agencies that rely on them) should not assume that statistically significant results are valid. This is especially so for studies with small numbers of subjects; small effect sizes (i.e., low odds ratios or relative risks); large numbers of relationships and/or alternative models tested; ambiguous, flexible or subjective research designs, definitions, and outcome measures; substantial financial and other interests and prejudices (including especially *regulatory agency* interests and prejudices); and politically "hot" scientific topics. Ioannidis recommends treating with great skepticism studies that have low positive predictive value. I distrust any study promoted by a university public relations department.

Unfortunately, studies with low positive predictive value dominate the relevant scientific literature on which regulatory agencies depend. This means, unfortunately, that agency reliance on published peer-reviewed studies is more likely to propagate error than reveal truth. Agencies can reduce error by obtaining study data and performing their own analyses, and more importantly, ensuring that policy critics also have full data access and opportunity to perform their own analyses. When scientists who disagree about policy agree about science is when science is most reliable. Skepticism, if not summary dismissal, is justified when policy opponents are denied the capacity to test studies for reproducibility.

B. Scientific and economic information published in the gray literature varies from extraordinarily transparent to utterly opaque.

Whereas scientific and economic information published in scholarly journals is fairly consistent in its (non)transparency, the transparency of gray literature varies

greatly. Perhaps the most transparent of gray literature are laboratory reports prepared in compliance with Good Laboratory Practice (GLP) regulations, the purpose of which are to ensure data integrity. GLP reports include extensive details on laboratory procedure, recordkeeping, standard operating procedures, quality control and quality assurance, and independent auditing—and data. GLP compliance is much more demanding than mere publication in a peer-reviewed journal, and it suffers no publication bias.

At the other extreme, transparency often is minimal, nonexistent or downright misleading in reports prepared by or for advocacy organizations. These reports are prepared to advance policy objectives; they are not a search for scientific truth. For this reason, advocacy organizations have a special obligation to maximize transparency. Bona fide scholars who perform research for advocacy organizations must be relentless in protecting their independence. Without data disclosure and thorough documentation of research methods, this may be impossible.

C. Agency-sponsored science is often agenda-driven, and agenda-driven science is highly susceptible to error, bias, inadequate validation, and a lack of transparency.

When an agency produces or sponsors the production scientific information, it may do so because there is a crucial data gap that public domain literature doesn't fill. It also may do so to advance an agenda that public domain literature doesn't support.

Agencies can produce their own science internally (by agency employees) or externally (by consultants and university faculty). The latter may insist on the right to publish and demand editorial control over content. These constraints incentivize agencies to restrict external research funding to scientists known to be sympathetic to the agency's agenda. The need for research funding may lead external researchers to discover sympathies for a funding agency's policy agenda. In short, every conflict of interest alleged to characterize privately funded scientific research applies to publicly funded research as well. (Conflict of interest rules focus worry more about dilute financial conflicts with for-profit sponsors than on concentrated financial conflicts with nonprofit and government sponsors.)

Agencies sometimes encourage their scientists to publish in peer-reviewed journals, but publication typically requires prior agency approval. Manuscripts that could conflict with an agency's agenda are less likely to be approved. Agency authors of such manuscripts should consider carefully whether publication is career enhancing. Agency authors may be denied the ability to conduct research on government time using government resources. The scientific output of government employees therefore has its own form of publication bias.

D. Information obtained via the Paperwork Reduction Act for regulatory development purposes is not generally transparent.

When an agency conducts or sponsors the collection of information from the public, it is statutorily required to comply with the PRA. Failure to obtain prior OMB approval violates the PRA's public protection provision (44 U.S.C. § 3512), which

forbids agencies from penalizing any person for failure to comply with a collection of information lacking a current OMB Control Number.

Information collected via the PRA can be transparent, but it is unlikely to be so unless the agency's research protocol requires it. Transparency is not required for OMB approval, and OMB lacks tools for enforcing it even when agencies volunteer it.

If transparency as a research feature is foregone anywhere in the information collection process, that loss is usually permanent. The first place transparency may be lost is in an agency's "60-day" notices published pursuant to 5 C.F.R. § 1320.8(d)(2)(i). In my experience, these notices are written to deter public understanding rather than to inform it. They often do not include sufficient information to inform public comment, and consequently there are few public comments submitted on 60-day notices.

The public gets a second opportunity for public comment when an agency publishes notice in the Federal Register that it has submitted an ICR to OMB for approval (5 C.F.R. § 1320.10(a)). These "30-day" notices are required to be published "[o]n or before the date of submission to OMB. They are just as cryptic as 60-day notices; agencies often fail to publish them on time; and Supporting Statements may include demonstrably false claims. There are few public comments on 30-day notices, and for mysterious reasons OMB denies the public access to them until it has made a decision on the submission. OMB often is less transparent than the agencies it oversees.

An ICR must include an "evaluation" of public comments the agency received on the 60-day notice (5 C.F.R. § 1320.5(a)(1)(ii)), plus a summary of these comments and explain how it responded (5 C.F.R. § 1320.5(a)(1)(iii)(F)). In practice, an agency can freely misrepresent whether it received public comments, the contents of the comments it did receive, or fail to respond in good faith, all without jeopardizing OMB approval.

In sum, scientific and economic information obtained by an agency, whether from the public domain or its own staff and contractors or through the PRA, is only as transparent as the agency wants it to be. Research protocols are supposed to be highly transparent, and oftentimes OMB insists on a high degree of transparency. Agencies do not need to comply with their research protocols because no one has the legal authority to ensure accountability.

E. Regulatory Impact Analyses

Agency RIAs are a special class of documents, rich with scientific and economic information, that is at the same time the most important and least reliable information regulatory agencies disseminate. Few RIAs are subjected to rigorous and independent peer review prior to submission to OMB, and OMB does not make public its reviews. Worse, in its annual reports to Congress on the benefits and costs of federal regulation, OMB simply summarizes agency estimates. To the extent that OMB review uncovers material errors, or OMB professionals develop fundamentally different estimates, this information is not included in OMB's reports, and indeed, never publicly disseminated.

When I left OIRA in 1998 I established a foundation-funded program to grade agency RIAs. To ensure transparency, I published the grading protocol before conducting

my first evaluation. A decided that to earn (!) a failing grade, an agency had to commit an error so egregious that the agency head, acting in accordance with statutory requirements or Executive branch directives, would choose a different alternative than the one actually selected. My project didn't succeed because every RIA I evaluated failed this simple test.

There is no evidence that the quality of RIAs has improved since then. I attribute this problem to agencies' combined monopoly power (they are the only "sellers") and monopsony power (they also are the only "buyers"). This has serious ramifications for proposed legislation that is intended to improve accountability (e.g., the REINS Act). Congress cannot make informed decisions about major regulations if the only analyses they get are unreliable agency RIAs. I believe that RIA quality and accountability will not improve unless and until these forms of market power are overcome.

IV. WHY HAVE EXISTING SYSTEMS FOR ENHANCING TRANSPARENCY FAILED?

The simple answer is existing systems for enhancing transparency fail because they were not designed to succeed. Several such systems are worth briefly discussing.

A. The Freedom of Information Act

The Freedom of Information Act (FOIA) (5 U.S.C. § 552) has limited value as a tool for achieving the transparency of scientific an economic information. FOIA can be used to force information disclosure, but the statute has numerous exemptions that agencies have learned how to expand.

B. The Shelby Amendment

Federal agencies have the contractual right to obtain data from projects they fund. They often choose not to do, for example to avoid having to disclose it to the public if served with a FOIA request.

The significance of data withholding reached a local zenith in the 1990s with controversial air pollution studies that were published in a journal that did not (and still does not) require data disclosure. Sen. Richard Shelby authored a rider to the Omnibus Appropriations Act for FY1999 (Pub. L. 105-277) requiring OMB to revise Circular A-110 to require federal agencies to make data produced under any award be made available to the public through FOIA. A 2013 Congressional Research Service report notes that OMB's A-110 revision "clearly was narrower than that in the legislative provision," and there is evidence that Sen. Shelby agrees with this conclusion.

I am aware of no one who believes that the Shelby Amendment has been effective. The available evidence suggests that there have been few Shelby-driven data requests. Improved data access appears to be occurring because more scholarly journals are adopting open data policies as conditions for manuscript acceptance. This is a more effective path. As I note in Section V, Congress can encourage this trend by changing scientists' incentives rather than trying to compel them to act contrary to their interests.

C. Peer review

Peer review is the primary method relied upon for quality control by both scholarly journals and regulatory agencies. As I wrote in 2002 for a conference on peer

review that predated the OMB peer review guidelines, "Government peer review performs much the way one should expect it to perform given the interests of the people, institutions and issues involved" (http://bit.ly/1spWQIG).

1. Journal peer review

For a scholarly journal, peer review is a tool for maximizing its reputational value subject to the constraint of the number of pages it has available. The task, therefore, is to publish the best available manuscripts, where "best" is a complex variable that invariably includes estimates of their likelihood of being cited in the future by other scholars. A journal's reputation is derived primarily from its "Impact Factor," which is determined by subsequent citations. Not to put too fine a point on it, what matters is selling subscriptions, and in that way scholarly journals are basically highbrow supermarket tabloids.

Scholarly peer review serves other purposes. Journal editors hate issuing retractions, and the usual reasons for doing so are plagiarism, fraud (i.e., data fabrication or falsification), or prior publication elsewhere—not information quality deficiencies. (For an eye-opening look at this phenomenon, see the website *Retraction Watch* at http://bit.ly/1Xt3md2. In 2012 the authors proposed that Impact Factors be supplemented with a Transparency Index, to measure journals' substantive reliability. One of their criteria for this proposed index is whether the journal requires data disclosure, a key if not essential tool for discovering scientific fraud *after publication* (http://bit.ly/1TfxvaN).)

Journal peer reviewers are not asked to evaluate whether manuscripts comply with information quality principles. They rarely review the data and methods behind the manuscripts they evaluate, even if the data and methods are available, which as previously noted is rare. In their defense, peer reviewers lack the time and resources to do this and generally receive no compensation for their work. The purpose of data disclosure is therefore not to improve peer review *before* publication; it's to improve peer review *after* publication — such as before an agency relies upon it for public policy.

2. Government agency peer review

Agency peer review has a fundamentally different purpose. It is not to decide which agency manuscripts warrant publication; after all, publication is certain. It is not to determine when an agency manuscript is ready for publication; that is determined by the agency's schedule. In short, agencies conduct peer review to secure validation by external scientists of the merits of their policy decisions.

Most agency-generated scientific information is synthetic—that is, it consists of secondary reviews, often selective, of the primary literature. These reviews may be represented as objective or unbiased, but that requires, at a minimum, independence of agency control, influence, customs and procedures, none of which regulatory agencies allow. These work products are structurally, procedurally and substantively divergent from genuine objectivity (i.e., displaying no detectable policy bias), so agencies comply with OMB guidelines at best imperfectly, selectively, or not at all.

Data disclosure is extremely rare in federal agency peer review practice even though it may be essential for rigorous, independent peer review. OMB's proposed peer review guidelines (68 Fed. Reg. 54023) certainly implied that data disclosure was expected. Agencies would have had to disclose "sufficient information to enable [peer reviewers] to understand the data, methods, analytic results, and conclusions of the material to be peer reviewed" *in the context of the transparency and reproducibility provisions of OMB's Information Quality Guidelines* (p. 54028, referencing 67 Fed. Reg. 8452). Stripped of bureaucratese, this meant disclosure of research data and methods should occur except under truly extraordinary circumstances, such as when personal privacy, confidential business information or national security is at stake.

3. Applying the journal model to the government context has failed.

In its 2002 information quality guidelines, OMB required pre-dissemination review to reduce the incidence of error but granted agencies substantial discretion concerning how to conduct it. Agencies abused this discretion by systematically ignoring the requirement.

OMB responded by trying to graft journal peer review into the information quality context. This failed for a number of reasons, some of them obvious. For example, OMB's 2005 final peer review guidelines were watered down from its 2003 proposal. *Compare* 67 Fed. Reg. 54028 with 70 Fed. Reg. 2676. This enabled agencies to use peer review as a shield against compliance instead of a spur to improvement. In addition, OMB created a wholly unmeritorious carve-out for the National Academy of Sciences (70 Fed. Reg, 2672; Section IV). All information the Academy disseminates, and every peer review it performs, is automatically given an irrebuttable presumption of compliance with information quality principles *even of the Academy ignores or transparently violates them*.

This reform also failed for more subtle reasons related to purpose (as noted in the previous subsection) and process. In scholarly peer review, dissertation committee chairmen and journal editors own the review process and decide whether and when a supplicant student or scholar reviewee's work product is ready for publication. In agency peer review, however, the agency-reviewee owns and controls the review process. The agency-reviewee selects the peer reviewers (or vetoes those it deems unacceptable), decides which questions to ask the reviewers to answer, funds and staffs the review process, controls the flow of information among reviewers, manages the discussion agenda, and forces reviewer completion in time to meet its publication deadline. Unlike journal peer reviewers, agency peer reviewers are not anonymous and must work in a fishbowl. In many cases, they owe their livelihoods to the agency-reviewee, which surely undermines their ability and willingness to speak truth to power. As for *intellectual* independence — perhaps the most important attribute in a peer reviewer asked to opine on the fundamental correctness of a government work product — that is the rarest of all birds in the government peer review roost. Why would an agency voluntarily seek the input of those who disagree with it? Indeed, there are so many differences between peer review for a scholarly journal and per review for a government agency that, as I wrote in

the 2002 paper cited earlier, "Government peer review is so different it ought not be called by the same name."

D. Information Quality Act

The IQA has proved to be much less effective than its advocates hoped or its opponents feared. Both sides seem to have underappreciated the extent to which senior agency personnel recognized that IQA principles posed an existential threat to many regulatory programs. The point of departure in this resistance effort was the promulgation of agency-specific guidelines that promised the world but delivered little of substance. This happened in part because OMB's guidelines did not compel agency compliance, such as by explicitly subjecting compliance to judicial review.

E. Regulatory Impact Analyses

Since Executive Order 12,291 was issued in 1981, the key economics work product in support of regulatory decision-making is the Regulatory Impact Analysis ("RIA"). These documents, though oftentimes voluminous, rarely comply with OMB's information quality standards for transparency and reproducibility. They also fall far short of the substantive standard of objectivity. RIAs may have been intended to enable benefit-cost analysis to *inform* regulatory decision-making, but 35 years later it is clear that their current purpose is to *defend* decisions made on noneconomic grounds.

OIRA is the primary (if not sole) agency responsible for ensuring that RIAs adhere to transparency other information quality standards. This job is impossible to fulfill without either granting OMB statutory enforcement authority to compel compliance or explicitly allowing the public to do through the courts. Congress may not be willing to delegate that authority, but if it doesn't, a number of apparently popular regulatory reforms (e.g., the REINS Act) cannot succeed because Congress would be dependent on RIAs that do not adhere to transparency and other information quality principles.

Ironically perhaps, some of OIRA's actions have undermined its capacity for effectiveness. I have already discussed problems in its 2005 final peer review guidelines. I have not, however, previously noted that the guidelines explicitly exempt RIAs from peer review requirements on the ground that they are "already reviewed through an interagency review process under E.O. 12866 that involves application of the principles and methods defined in OMB Circular A–4" (70 Fed. Reg. 2674). This is a *non sequitur*; OMB Circular A-4 has nothing substantive to say about information quality, and it makes adherence to information quality guidelines voluntary.

F. The Paperwork Reduction Act

The purpose of the PRA is to minimize paperwork burden on the public and ensure the greatest possible public benefit from and maximize the utility of information created, maintained, used, shared and disseminated by or for the Federal Government (44 U.S.C. §§ 3501(1)-(2)). There is an obvious overlap with the IQA; hence, the latter's codification within the PRA (44 U.S.C. § 3518 note). Indeed, OMB has amended its internal procedures to require agency heads to certify that their ICRs comply with OMB's

information quality guidelines. But OMB has not amended its *regulations* to require IQA compliance. OMB doesn't require that agency certifications be true, or require agencies to actually comply with the PRA's procedural and substantive requirements.

There are many potential explanations for this. For example, over the years OIRA leadership may have lost interest in the PRA even though it is the reason the Office was created. But every incremental diminution of leadership interest likely makes future compliance harder to enforce. OIRA staff also respond to incentives: there are fewer internal rewards for critically reviewing ICRs than expediting the publication of regulations. The size of the OIRA career staff has shrunk by more than half in 35 years while its scope of responsibilities has surely more than doubled. I am agnostic concerning these, and other, possible explanations for OIRA's ineffectiveness. I will note that OIRA receives over 4,000 ICRs to review each year (4,261 ICRs in CY 2015). OIRA has no choice but to review ICRs selectively, and selective review means a lot of ICRs that grossly violate the PRA are nevertheless approved.

These defenses notwithstanding, OIRA sometimes fails to properly implement the PRA even when it's easy to do so. In 2008, I brought to OIRA's attention via public comment the fact that the U.S. Patent and Trademark Office sought to quietly cover up a decades-long violation of law (http://bit.ly/1WzThvt). OIRA correctly declined to approve the relevant ICR, but its decision not to act instead of issuing a disapproval was inherently nontransparent. More disturbingly, OIRA did not correctly flag this ICR as a "bootleg" in its Report to Congress for FY2009 (http://1.usa.gov/27p82VK).

In 2013, I informed OIRA of another gross PRA violation in a major Patent Office ICR (http://bit.ly/1Tcb3EI), this one involving billions of dollars in uncounted paperwork burden going on for more than 30 years. Instead of issuing an approval correctly limited to future paperwork, without providing any rational basis OIRA exempted this information from the definition of "information" in 5 C.F.R. § 1302.3(h).

In sum, Congress cannot expect the PRA to be an effective tool for improving transparency. The law delegates enormous power to OMB, but there is nothing that can be done if OMB chooses not to require agencies to be transparent or cuts corners itself.

V. POSSIBLE REMEDIES

I have alluded to a few ways that Congress might act to improve regulatory agency transparency. Here I briefly describe them somewhat more systematically.

A. Create statutory Executive branch authority to enforce transparency.

Transparency is an unusual public good: no government agency wants to provide it. Congress could require transparency as the price for the delegation of legislative authority. To date it has not done so.

The text of the IQA suggests that Congress naïvely expects OMB to enforce transparency and other information quality standards. OMB may be the least transparent of Executive branch agencies with respect to its own actions; why does Congress expect it to enforce transparency elsewhere? Indeed, all of OMB's relevant expertise concerns *avoiding* transparency. Nevertheless, Congress could act to enhance OMB's authority to

enforce transparency. This might work if OMB leadership were willing to cooperate. The likelihood of success seems low but it might be worth trying anyway—especially in concert with the next remedy.

B. Make deficiencies in transparency and reproducibility justiciable.

To date, no court has required agencies to adhere to transparency and other information quality standards. The IQA is silent with respect to judicial review, and most courts have interpreted silence as a bar to standing. Transparency would be greatly enhanced if Congress explicitly gave the public standing to hold agencies' accountable.

Congress has delegated legislative authority to Executive branch agencies, but it has not required them to exercise this authority transparently. Admonishments ("agencies *should*"), especially after the fact, are not enforceable. Unambiguous directives ("agencies *shall*") are not much better unless Congress clearly establishes a cause of action for alleged violations. Allowing successful petitioners to claim attorneys' fees would incentivize the filing of meritorious lawsuits, particularly by regular citizens and small entities, who otherwise would be deterred by litigation expenses in excess of the injury suffered. Holding agencies financially responsible for these fees out of their own budgets, instead of through the Treasury Department's Judgment Fund, would incentivize agencies not to litigate meritorious lawsuits, and in the long run, act more transparently simply to avoid litigation risks. Transparency will be accomplished when transparency is worthwhile *from an agency's own perspective*.

C. Deter agencies' reliance on nontransparent information.

OMB's information quality standards are not currently enforceable. Therefore, agencies should be expected to enforce low standards on information they want to rely upon and high standards on information they dislike. In 2008 I discovered that EPA judged the utility of observational epidemiology studies completely differently depending on context. The Agency regarded these studies very highly when they appeared to support its proposed NAAQS for ozone, but they dismissed these studies as methodologically substandard when they did not support its next NAAQS for nitrogen oxides. I hypothesize that inconsistencies of this sort are commonplace.

Congress could improve transparency by restricting reliance on studies for which the underlying data and methods have not been fully disclosed. Exceptions could be made for situations in which transparency conflicts with other important considerations, such as national security. No exception should be made for individual privacy, however. Study participants can be de-identified. If this isn't sufficient, then the sample is too small.

A related reform Congress could make is to restrict the use of information collected through the PRA that does not adhere to the research protocols and certifications agency heads made when they obtained OMB approval. Congress could do what OMB lacks the resources, if not also the will, to do: require agencies to actually comply with their own public commitments.

VI. CONCLUSIONS

Improving the transparency of scientific and economic information relied upon by regulatory agencies is difficult because the players involved have strong reasons not to comply. This includes most of the scientists who perform the work, the scholarly journals that publish it, the agencies that rely on it, and the peer reviewers who bless it.

Improving the transparency of regulatory agency work products is more difficult because peer review has been misused as a presumptive validator of fundamental correctness. It was never intended for this purpose, and no peer review is structured to address this question. The quality of agency peer review would improve if Congress deterred agencies from relying on nontransparent information. It would improve even more if Congress explicitly directed agency peer review panels to first evaluate compliance with information quality principles, including transparency, and conduct a substantive review only with respect to those government work products (or portions thereof) that adhere to applicable information quality standards.

More progress is likely to be made by creating incentives that are compatible with disclosure. Every participant in the process, including the public, needs such incentives, but the public cannot participate effectively unless Congress removes the statutory barriers that prevent effective participation.