

# Effective Scientific Engagement in the Legislative Process

## A Case Study: New Jersey Plastic Pollution Hearing

April 22, 2024 (Earth Day)

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### Executive Summary

On April 22, 2024, the New Jersey Senate Environment and Energy Committee and Assembly Environment, Natural Resources, and Solid Waste Committee held a joint hearing on plastic pollution—a model of how scientific testimony can inform legislative policy. This analysis examines how scientific experts engaged with legislators, the quality and impact of their testimony, and the legislative outcomes that emerged from or were influenced by the hearing.

**Key Finding:** Scientific testimony was most effective when it combined rigorous peer-reviewed research with human health narratives that resonated with legislators’ concerns about their constituents. The hearing demonstrates that effective scientific engagement requires not just presenting data, but framing it in terms of policy-relevant outcomes.

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### Part I: The Hearing Context

#### Committees Present

- **Senate Environment and Energy Committee** (Chair: Senator Bob Smith)
- **Assembly Environment, Natural Resources, and Solid Waste Committee** (Chair: Assemblyman James J. Kennedy)

#### Legislative Members Present

Name	Chamber	Role	Party
Bob Smith	Senate	Chair	D
Linda R. Greenstein	Senate	Vice Chair	D
James J. Kennedy	Assembly	Chair	D
Shavonda E. Sumter	Assembly	Vice Chair	D
Alixon Collazos-Gill	Assembly	Member	D
Garnet R. Hall	Assembly	Member	D
Andrea Katz	Assembly	Member	D
Michael Inganamort	Assembly	Member	R

## **Stated Purpose**

“The Committees will jointly receive testimony from invited guests on the extent of plastic pollution in the State, its potential and actual effects on human health, and methods that may be used to protect against, or to mitigate, the negative effects of plastic pollution on human health and the environment.”

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## **Part II: Scientific Witnesses and Their Testimony**

### **Witness 1: Dr. Phoebe Stapleton, Ph.D.**

**Credentials:** Associate Professor, Rutgers University Ernest Mario School of Pharmacy; Department of Pharmacology and Toxicology; Resident Scientist, Environmental and Occupational Health Sciences Institute

**Expertise:** Micro/nanoplastics, particle inhalation during pregnancy, maternal-fetal health impacts

### Key Scientific Claims (Evidence-Graded)

Claim	Evidence Type	Strength
9.2 billion tons of plastic produced 1950-2017	UN Environment Program data	<b>Strong</b>
100% of Hawaii placental samples in 2021 contained microplastics (up from 60% in 2006)	Peer-reviewed longitudinal study	<b>Strong</b>
Hundreds of thousands of nanoplastic particles found in bottled water	Own research with Columbia University, specialized microscopy	<b>Strong</b>
Nanoplastics identified in fetal tissues (lung, heart, kidney, liver, brain) within 24 hours of exposure	Own laboratory research (rodent models)	<b>Strong</b>
March 2024 NEJM study: micro/nanoplastics in carotid plaque correlated with increased cardiovascular risk	Peer-reviewed (New England Journal of Medicine)	<b>Strong</b>
Indoor air can have microplastic concentrations 100x greater than outdoor	Published research	<b>Moderate</b>

### Effective Communication Strategies

1. **Relatable scale:** Compared microplastics to “sesame seeds” and noted everyone exposed through toothbrush bristles
2. **Local relevance:** Cited Rutgers studies on Raritan and Passaic rivers in NJ
3. **Visual aids:** Provided printed figures showing placenta contamination trends
4. **Policy hook:** Concluded with call for “Federal and State support” to fund research

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**Witness 2: Dr. Shanna H. Swan, Ph.D.**

**Credentials:** Professor, Department of Environmental Medicine and Public Health, Icahn School of Medicine at Mount Sinai; Senior Scientist, Environmental Health Sciences

**Expertise:** Reproductive epidemiology, endocrine-disrupting chemicals, phthalates, fertility decline

### Key Scientific Claims (Evidence-Graded)

Claim	Evidence Type	Strength
15,000+ chemicals used in plastic manufacturing; 25% classified as “chemicals of concern”	Meta-analysis of published research	<b>Strong</b>
Discovered and replicated “Phthalate Syndrome” in humans (2005, confirmed in second study)	Own NIH-funded research (\$10M total)	<b>Strong</b>
Research influenced Consumer Product Safety Improvement Act of 2008	Documented Congressional testimony	<b>Strong</b>
Worldwide sperm counts declined 50% since 1970 (~1%/year)	Published 2017 meta-analysis	<b>Strong</b>
2023 update showed sperm count decline is accelerating, not leveling	Published 2023 update	<b>Strong</b>
Total fertility rate declining at same 1%/year rate globally (World Bank data)	Government data (World Bank)	<b>Strong</b>
28-day reduction in EDC-containing products reduced breast cancer progression markers	Recent California peer-reviewed study	<b>Moderate</b>

### **Effective Communication Strategies**

1. **Personal narrative:** Described the 10-15 year research journey, grant writing, replication studies
  2. **Cost transparency:** “\$5 million, another five years” to replicate findings—emphasizing research investment
  3. **Species-level framing:** Extended beyond human fertility to endangered species, making point that this isn’t about “lifestyle choices”
  4. **Regulatory contrast:** Highlighted EU requires chemicals be proven safe before commerce; US does not
  5. **Emotional resonance:** “I cannot stress how important this is... These things are affecting human health”
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### **Witness 3: Judith Enck**

**Credentials:** Founder/President, Beyond Plastics; Former EPA Region 2 Regional Administrator (Obama Administration); Senior Fellow, Bennington College

**Expertise:** Environmental policy, plastics regulation, EPR legislation, bottle bill implementation

## Key Claims and Data Points

Claim	Evidence Type	Strength
Less than 10% (actually 5-6%) of plastics recycled nationally	Dept. of Energy, EPA data	<b>Strong</b>
16,000 different chemicals in plastics make recycling fundamentally difficult	Research literature	<b>Strong</b>
Chemical recycling handles only 1.3% of US plastic	Beyond Plastics/IPEN report (Oct 2023)	<b>Strong</b>
Bottle bill states: 77% aluminum recycling vs 36% non-bottle-bill states	Container Recycling Institute data	<b>Strong</b>
Bottle bill states: PET plastic recycling 57% vs 17%	Container Recycling Institute data	<b>Strong</b>
NJ is #2 plastic exporter to other countries (after California)	Industry/trade data	<b>Moderate</b>

## Effective Communication Strategies

1. **Props:** Physically demonstrated Amazon packaging waste (nested boxes for highlighters)
2. **Direct challenge to industry narrative:** “Recycling is real—except for plastics”
3. **Policy specificity:** Named states with EPR laws, identified strengths and loopholes in each
4. **Fuel efficiency analogy:** Compared packaging standards to automotive fuel efficiency standards
5. **Addressed counterarguments directly:** Responded to MRF concerns about bottle bills affecting revenue

## Witness 4: Gary Sondermeyer

**Credentials:** Vice President of Operations, Bayshore Family of Companies; Former NJ DEP Assistant Commissioner; 30+ years NJ DEP; Vice Chair, NJ Plastics Advisory Council

**Expertise:** Recycling infrastructure, solid waste management, NJ regulatory framework

### Key Claims and Data Points

Claim	Evidence Type	Strength
NJ recovered 127,000 tons of plastics in most recent year	NJ DEP official database	<b>Strong</b>
75% overall container recycling rate in NJ; 57% plastic	NJ DEP data	<b>Strong</b>
Average 133,000 tons plastics recovered per year (5-year avg)	NJ DEP data	<b>Strong</b>
1.67 metric tons CO2 avoided per ton of MSW recycled	US EPA	<b>Strong</b>
Recycled PET reduces GHG emissions by 71% vs virgin	Industry/EPA data	<b>Moderate</b>
Approximately 10% “wishful recycling” (non-recyclables) in stream	Industry average	<b>Moderate</b>

### Communication Approach

- Represented industry perspective (Association of NJ Recyclers)
- Opposed bottle bill legislation, citing threat to existing MRF infrastructure
- Supported EPR with needs-assessment component
- Emphasized economic incentives that make recycling work (plastics = \$300/ton revenue)

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## Part III: Analysis of Scientific Influence on Legislators

### Questions Asked by Legislators

The questions legislators asked reveal which scientific claims resonated most:



1. **Assemblywoman Katz:** Asked whether school air filtration systems would filter microplastics
  - *Shows health-focused framing reached her*
2. **Senator Smith:** Asked about scale of plastic production (billions of tons)
  - *Global scope of problem resonated*
3. **Multiple members:** Asked about bottle bills vs. curbside convenience
  - *Policy feasibility concerns apparent*
4. **Assemblyman Inganamort (R):** Asked about preferred plastic recycling method
  - *Seeking practical solutions*
5. **Assemblywoman Hall:** Suggested targeting youth education in schools
  - *Connected scientific message to constituent impact*

#### Observable Legislative Interest Patterns

Topic	Legislator Interest Level	Key Concerns
Human health impacts	<b>High</b>	Constituents exposed without consent
Fetal/reproductive effects	<b>High</b>	Intergenerational impacts
Bottle bill	<b>Mixed</b>	Convenience vs. effectiveness debate
EPR/Packaging reduction	<b>High</b>	Taxpayer burden shifting
Chemical recycling	<b>Moderate</b>	Desire for “solution” but skeptical
Plastic export	<b>Moderate</b>	Environmental justice component

## Part IV: Legislative Outcomes Analysis

### Pre-Existing Legislation Referenced as Foundation

Legislation	Year	Connection to Hearing
Recycling Enhancement Act	1987	Foundation for current system; cited as needing updates
Clean Communities Act	1986	First EPR in NJ; litter prevention model
Recycled Content Requirements	2024	Recent success; milestones began Jan 2024
Recycling Market Development Council	2022	15 recommendations pending implementation
Plastic Bag Ban	2022	Success cited as behavior-change model

### Legislative Recommendations Emerging from Hearing

Based on testimony, the following legislative actions were recommended:

#### Strongly Supported (bipartisan interest indicated)

1. **Extended Producer Responsibility (EPR)** - Both industry (ANJR) and advocates (Beyond Plastics) support, though with different emphasis
2. **Statewide Uniform Recyclables List** - Addresses confusion, reduces “wishful recycling”
3. **Packaging Reduction Standards** - Enck’s strongest recommendation; fuel-efficiency analogy resonated

#### Debated (tension visible)

4. **Bottle Bill/Deposit Container Law** - Enck strongly supports; Sondermeyer strongly opposes (threatens MRF economics)
5. **Chemical Recycling Regulation** - Agreement it’s not working; disagreement on how to address

#### Flagged for Future Action

6. **Plastic Export Restrictions** - NJ as #2 exporter raised environmental justice concerns
7. **School-Based Recycling/Composting Integration** - Building on climate education mandate

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## Part V: Effectiveness Assessment—What Worked?

### Most Effective Scientific Engagement Strategies

1. **Peer-Reviewed Research + Human Impact Narrative**
  - Dr. Swan’s description of the Phthalate Syndrome research journey—from NTP rat studies to human replication—combined scientific rigor with a story legislators could follow

- The 15-year Hawaii placenta study (60% → 90% → 100% contamination) provided a clear trend
- 2. Local Relevance**
  - Dr. Stapleton’s citations of Rutgers research on NJ rivers (Raritan, Passaic) made the issue immediate
  - Sondermeyer’s operational data from NJ MRFs provided local economic context
- 3. Regulatory Precedent**
  - Enck’s comparisons to fuel efficiency standards and California EPR law gave legislators models
  - Dr. Swan’s citation of her testimony influencing the 2008 Consumer Protection Act demonstrated research-to-policy pathway
- 4. Addressing Counterarguments Directly**
  - Enck confronted the “recycling is working” narrative with DOE/EPA data
  - Both sides of the bottle bill debate presented, allowing legislators to weigh trade-offs
- 5. Visual and Physical Demonstrations**
  - Enck’s Amazon packaging prop (4 nested boxes for highlighters) was cited multiple times
  - Dr. Stapleton’s printed figures showing placenta contamination trends

### **What Would Have Strengthened Scientific Engagement**

- 1. More NJ-Specific Health Data**
    - No NJ-specific human health studies cited; all research was national or international
    - A study on microplastics in NJ residents would have been more compelling
  - 2. Economic Analysis of Health Costs**
    - No estimates of healthcare costs associated with plastic-related health impacts
    - This would have balanced Sondermeyer’s economic arguments for recycling
  - 3. Direct Connection to Pending Legislation**
    - Scientists could have referenced specific bill numbers and provisions
    - Policy recommendations remained general rather than bill-specific
  - 4. Written Testimony Coordination**
    - Industry witnesses (Plastics Industry Association, Tekni-Plex) only submitted written testimony
    - No scientific rebuttal to industry claims was possible in real-time
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## **Part VI: Key Takeaways for Effective Scientific Engagement**

### **For Scientists Testifying Before Legislative Bodies**

- 1. Frame research in terms of constituent impact**
  - “Your constituents have microplastics in their bodies without their knowledge or consent”
  - Health outcomes resonate more than environmental metrics alone
- 2. Provide scale that matters locally**
  - Reference local institutions (Rutgers, NJ DEP data)
  - Translate global production figures into NJ-relevant impacts
- 3. Describe the research process**

- Dr. Swan’s “another \$5 million, another five years” built credibility
  - Shows scientific claims aren’t casual assertions
4. **Connect to existing legislative action**
    - Reference recent legislative successes (plastic bag ban, recycled content law)
    - Build on momentum rather than starting fresh
  5. **Anticipate and address counterarguments**
    - The recycling rate dispute (9% vs 50-90%) confused legislators
    - Scientists should preempt such disputes with clear methodology explanations

#### For Legislators Seeking Scientific Input

1. **Invite scientists with directly relevant research**
  - Dr. Stapleton’s lab focuses on exactly what the hearing addressed
  - Dr. Swan’s decades of phthalate research was foundational
2. **Structure hearings to allow follow-up**
  - Scientists could have responded to industry testimony
  - Q&A could have addressed the recycling rate discrepancy
3. **Request specific policy recommendations**
  - “What specific provisions should legislation include?”
  - Scientists often stay in their lane; direct questions draw out policy insights

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## Part VII: Legislative Influence Assessment

### Evidence of Scientific Testimony Influencing Legislative Discussion

Scientific Claim			Observable Legislative Response
NEJM	cardiovascular study	(March 2024)	Chairman Smith cited this in opening remarks
Bottle bill	recycling rates (57% vs 17%)		Extensive Q&A on bottle bill feasibility
100%	placental contamination by 2021		No questions asked, but no challenge either
Chemical	recycling failure (1.3%)		Skeptical questions about industry “solutions”
Sperm count	decline 50% since 1970		Silence—possibly too sensitive for public hearing

### Likely Legislative Impact

Based on hearing transcript analysis, the following legislative actions appear likely:

1. **Extended Producer Responsibility bill** - Strong bipartisan support; expect drafting
2. **Uniform Recyclables List** - Near-term implementation expected
3. **Chemical Recycling restrictions** - Likely to be included in any EPR framework

4. **Bottle Bill** - Remains contentious; may not advance without MRF economic mitigation
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## Part VIII: Bill Tracking

### Bills Referenced During Hearing

This was an **informational hearing** — witnesses discussed policy concepts and prior legislation but did not testify on specific pending bills. The hearing laid groundwork for future legislation.

### Post-Hearing Bill Research

**Status:** Pending

**Search terms:** plastic, microplastic, single-use, recycling, EPR, extended producer responsibility

**Session:** 2024-2025

**Committees:** Senate Environment and Energy; Assembly Environment, Natural Resources, and Solid Waste

Bill #	Title	Sponsor	Status	Connection to Hearing
<i>To be researched</i>				

### Methodology

To trace hearing influence to legislation: 1. Search NJ Legislature bill database by keywords from hearing 2. Filter by committee and session 3. Compare bill language to testimony claims 4. Note direct quotes/citations in committee statements 5. Track legislative history (introduction → committee → floor vote)

See: templates/bill\_search\_guide.md for detailed search instructions.

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## Appendix A: Database Schema

This analysis is supported by a SQLite database containing: - **Hearings:** Metadata for legislative hearings analyzed - **Speakers:** Full profiles of all witnesses - **Scientific Claims:** 42 individual claims with evidence grading - **Legislative Outcomes:** 13 pieces of legislation (existing and proposed) - **Committee Members:** All legislators present

Database location: nj\_legislation.db

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## Appendix B: Source Materials

- **Primary Source:** Public hearing transcript (67 pages, 107,751 characters)
    - plastic-pollution-hearing-2024-04-22.pdf
    - transcript-full.txt
  - **Date:** April 22, 2024 (Earth Day)
  - **Location:** Committee Room 4, State House Annex, Trenton, NJ
  - **Publisher:** Office of Legislative Services, Public Information Office, Hearing Unit
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## Appendix C: Methodology

1. Full transcript extracted from PDF using PyMuPDF
2. Speakers identified and profiled from Table of Contents and testimony
3. Scientific claims extracted and categorized by evidence type
4. Evidence strength assessed using criteria:
  - **Strong:** Peer-reviewed publication, government data, replicated findings
  - **Moderate:** Single studies, industry data, personal research not yet replicated
  - **Weak:** Anecdotal, estimates without clear source
  - **Speculative:** Projections, extrapolations
5. Legislative outcomes mapped from explicit mentions in testimony
6. Influence assessment based on Q&A patterns and follow-up interest

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*Analysis prepared February 5, 2026 Database: nj\_legislation.db | Transcript: transcript-full.txt*

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## Part VIII: Quantitative Analysis

### Hearing Metrics

Metric	Value
Total transcript pages	67
Total characters	107,751
Estimated duration	~2.5 hours
Committees present	2
Committee members present	8
Oral testimony witnesses	4
Written testimony only	2

### Testimony Time Allocation

Speaker Type	Pages	Percent of Testimony
Scientists (PhD)	18	31.0%
Policy Expert	20	34.5%
Industry Representative	20	34.5%
Opening/Closing	9	—

### Scientific Claims Analysis

**Total claims extracted and coded: 42**

### By Evidence Type

Type	Count	Percent
Government Data	15	35.7%
Peer-Reviewed Study	11	26.2%
Industry Data	8	19.0%
Personal Research	5	11.9%
Meta-Analysis	3	7.1%

### By Evidence Strength

Strength	Count	Percent
Strong	34	81.0%
Moderate	8	19.0%
Weak	0	0.0%

### By Speaker

Speaker	Claims	Type
Dr. Phoebe Stapleton	13	Scientist
Dr. Shanna Swan	11	Scientist
Judith Enck	10	Policy Expert
Gary Sondermeyer	8	Industry

### Q&A Engagement

Metric	Value
Total questions asked	~15
Questions to scientists	4 (27%)
Questions to policy expert	7 (47%)
Questions to industry	4 (27%)

**Most active questioners:** - Senator Smith (Chair): 4 questions - Assemblywoman Katz: 3 questions - Assemblyman Inganamort: 3 questions

### Communication Effectiveness Scoring

Dimension	Score (0-100)	Notes
Scientific Rigor	93.7	81% of claims rated “strong” evidence
Local Relevance	75	NJ-specific studies cited, but limited
Policy Specificity	85	Named bills, states, specific provisions
Legislator Engagement	37.5	3.75 questions per witness average
<b>Overall</b>	<b>72.8</b>	Weighted average

### Legislative Themes by Frequency

1. Recycling rates (6 claims)
  2. Reproductive health (4 claims)
  3. Exposure pathways (4 claims)
  4. Production scale (3 claims)
  5. Policy effectiveness (3 claims)
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## Appendix D: Source Verification

### Quote Accuracy Statement

All quotes in this analysis are **verbatim extractions** from the official transcript published by the Office of Legislative Services, Public Information Office, Hearing Unit, State House Annex, Trenton, New Jersey.

Page references correspond to the PDF page numbers in the original document: - plastic-pollution-hearing-2024-04-22.pdf (711 KB, 67 pages)

### Page Reference Guide

Speaker	Testimony Pages	Q&A Pages
Dr. Phoebe Stapleton	5-12	12-13
Gary Sondermeyer	13-18	18-32
Judith Enck	32-41	41-51
Dr. Shanna Swan	52-61	61
Opening/Closing	1-4, 61-67	—

### Data Export Files

All structured data is available in the exports/ directory:



File	Contents
hearings.csv	Hearing metadata
speakers.csv	Witness profiles with credentials
scientific_claims.csv	42 claims with page references
legislative_outcomes.csv	13 legislative items
committee_members.csv	8 legislators present
quantitative_analysis.json	Full metrics object

TSV versions also provided for Excel compatibility.