



NSF 16-028 Dear Colleague Letter:
Germination of Research Ideas for Large
Opportunities and Critical Societal Needs
(GERMINATION)

National Science Foundation
Directorate for Engineering

*Office of Emerging Frontiers and
Multidisciplinary Activities (EFMA)*

<http://www.nsf.gov/pubs/2016/nsf16028/nsf16028.jsp>



AGENDA



11 a.m. WELCOME AND INTRODUCTION

11:05 Context and Overview

11:30 Question and Answer





'Housekeeping Notes'

DURING THE MEETING

- During the webcast, you can ask questions:
 - Use Webex interface
 - Backup: Send Email to LHOWE@nsf.gov
- During the webcast, if for any reason you lose signal, please rejoin the meeting using the following URL:
http://www.nsf.gov/events/event_summ.jsp?cntn_id=137052&org=NSF





'Housekeeping Notes' (cont'd)

AFTER THE MEETING

- After the meeting, a copy of the slides will be archived and available on the EFMA website:
www.nsf.gov/eng/efma
- After the meeting, you can submit questions to:
 - Email gfordyce@nsf.gov
 - Call 703.292.8305 (AFTER THE MEETING ONLY)





Key website Address

- **EFRI Website. Please refer to it for up-to-date information.**

www.nsf.gov/eng/efma





The Imperative for High-Impact Research

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**Sohi Rastegar, Director, Office of Emerging Frontiers and
Multidisciplinary Activities (EFMA)**





Context

- NSF ENG supports fundamental research in engineering
- Ultimate impact of fundamental research advances is not easy to predict
- Working hypothesis: it is possible to design environments and/or experiences that maximize the probability of researchers formulating high impact research problems
- Impact can be in generating surprising discoveries and/or breakthrough solutions to pressing societal problems

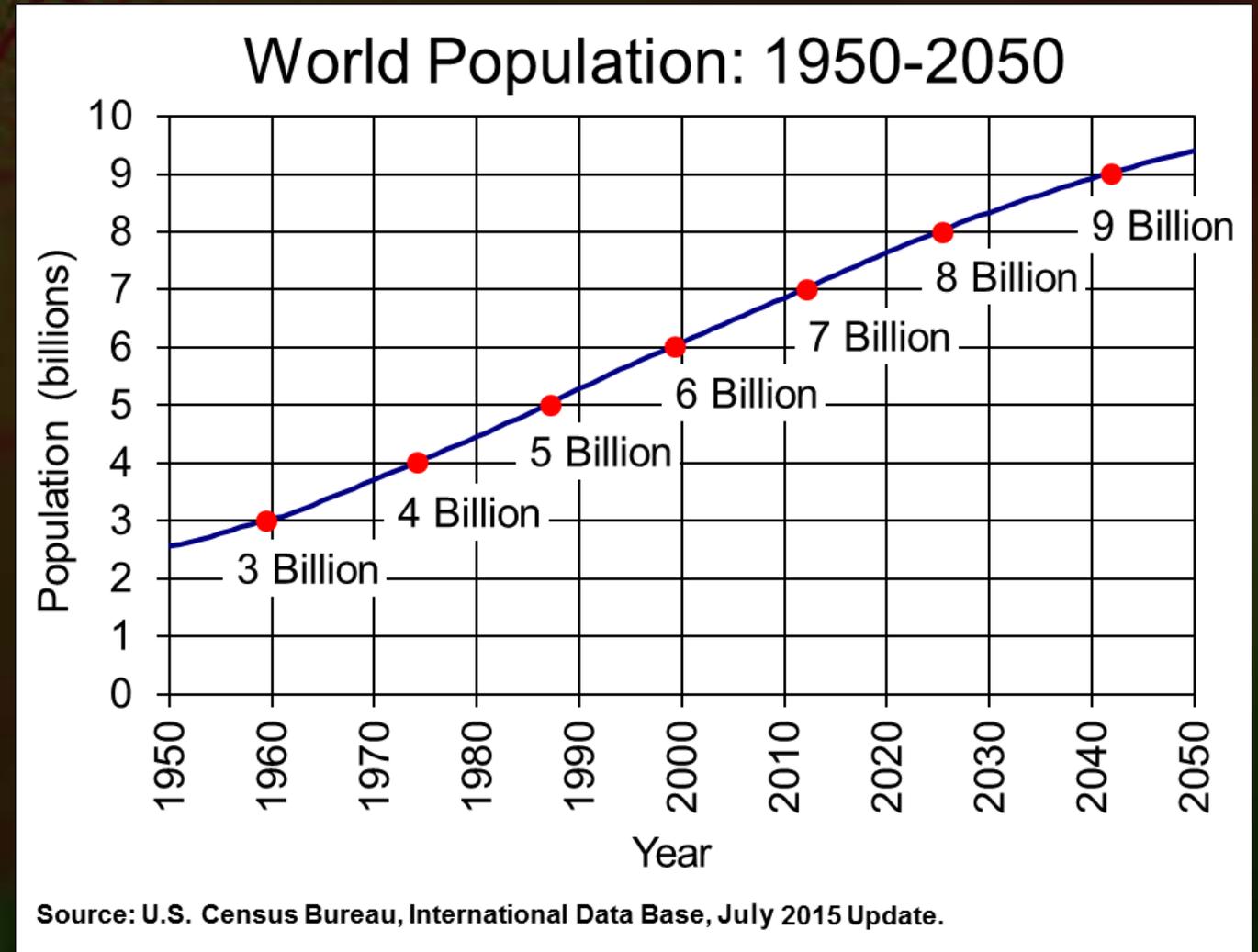
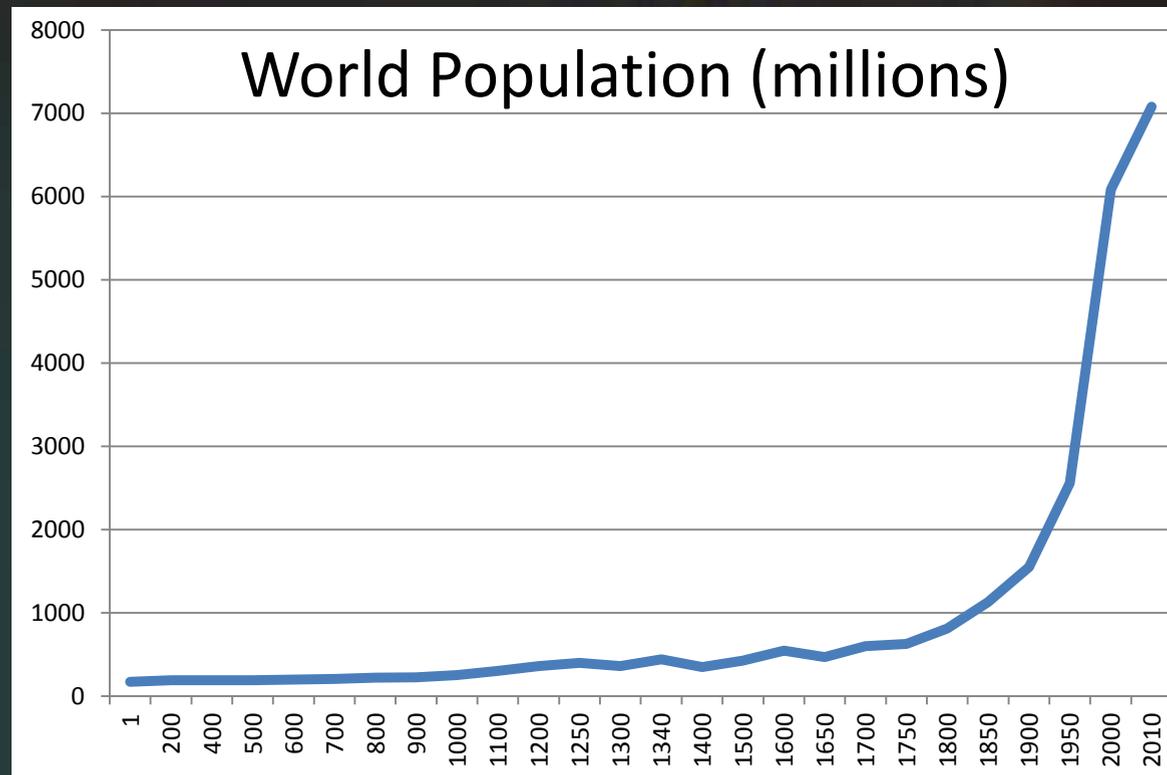




While the Future is Unpredictable, some Trends are Clear



Growing Population



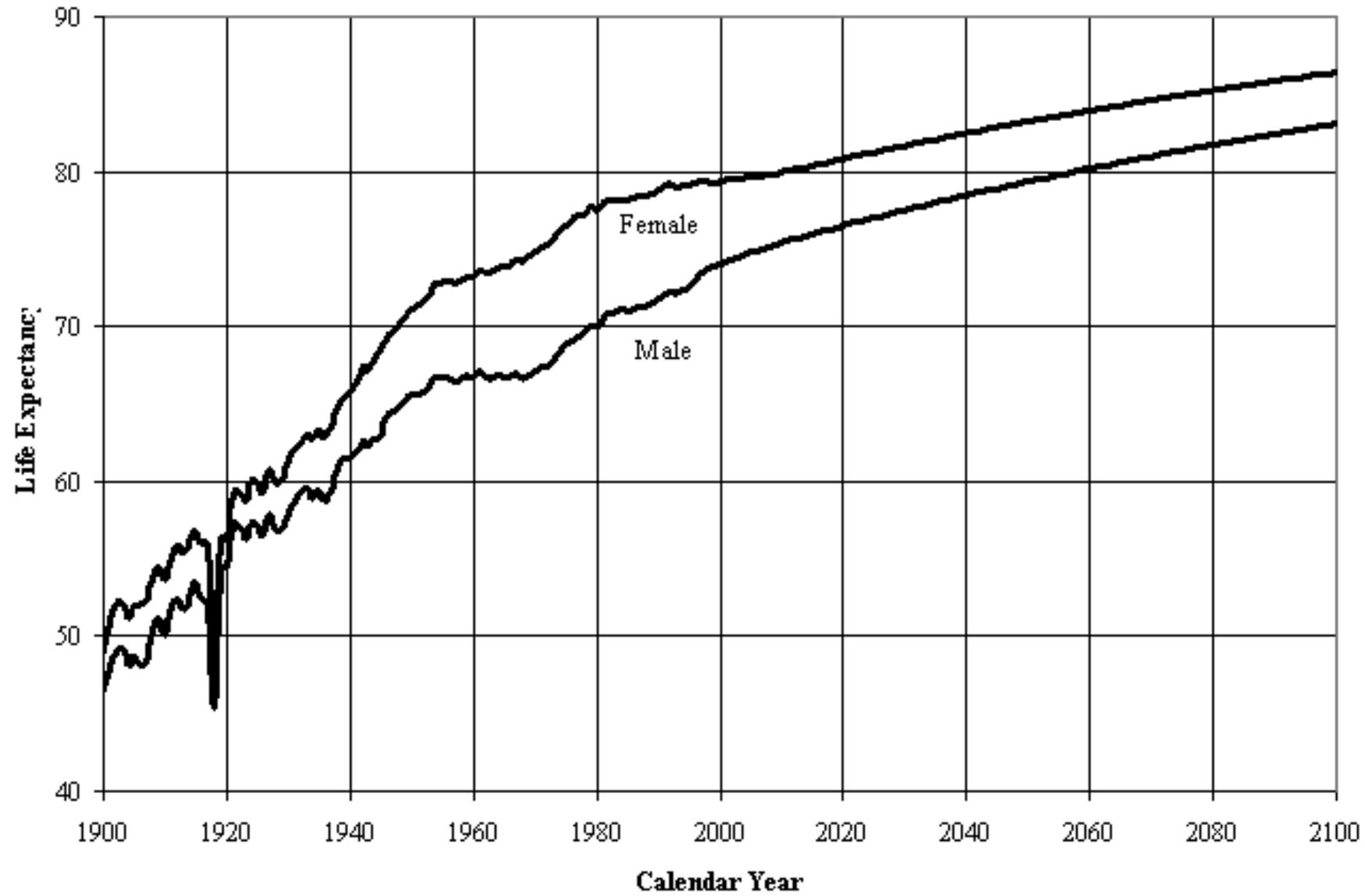
Source: U.S. Census Bureau, International Data Base, July 2015 Update.

9.6 Billion by 2050
400 Million in U.S.

Source: US Census Bureau



Aging Population



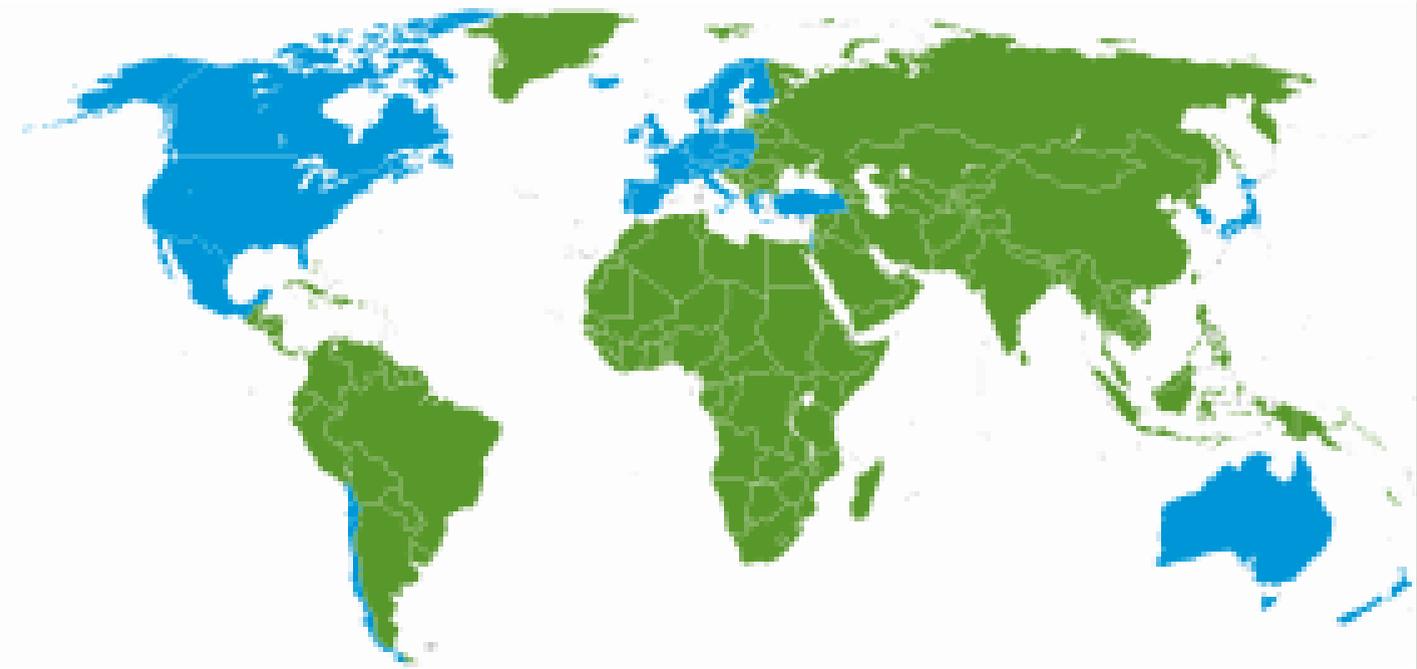
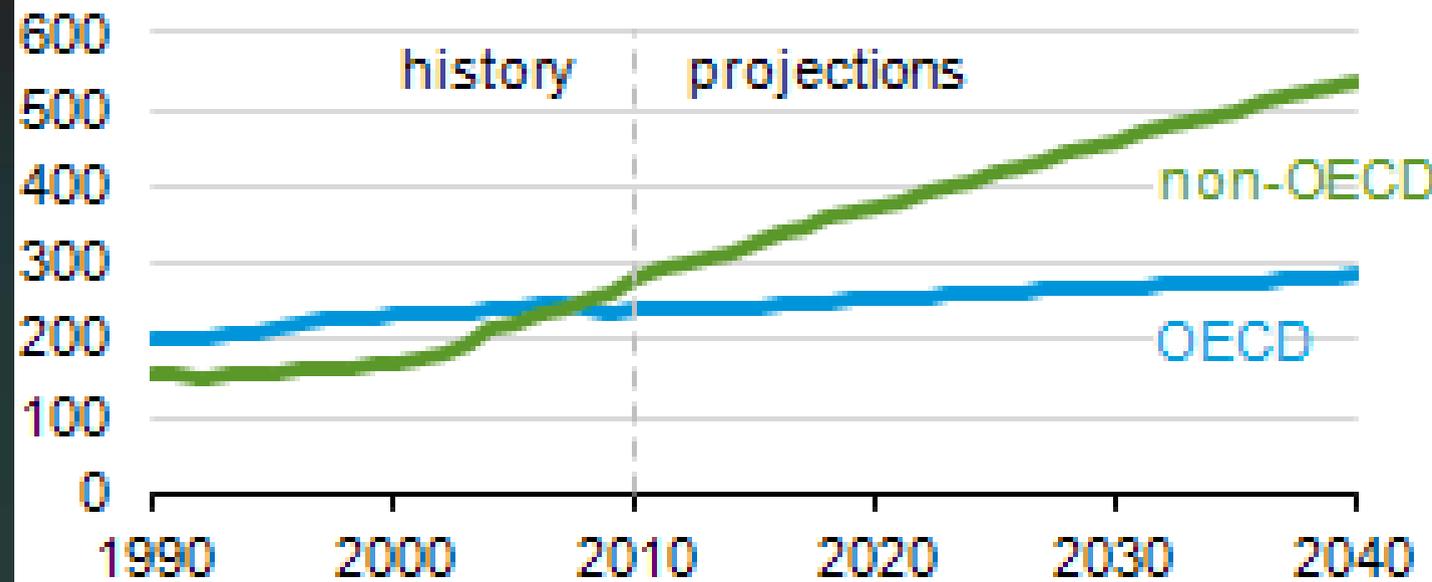
Source: USDA



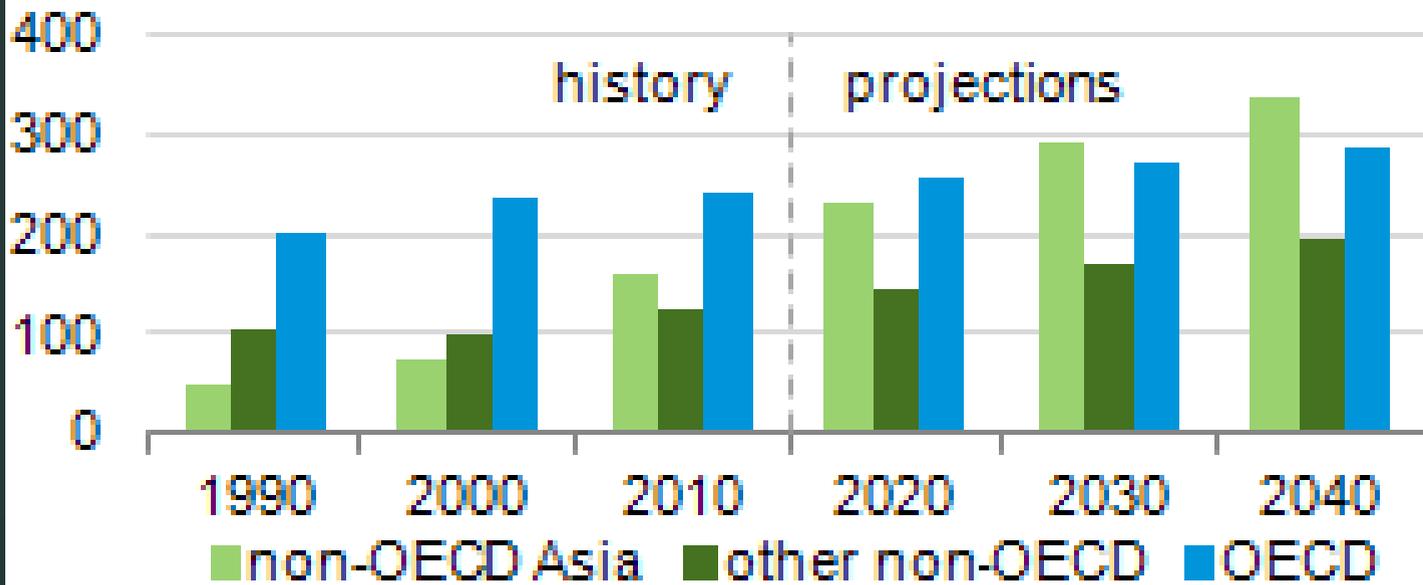
Increasing Energy Consumption



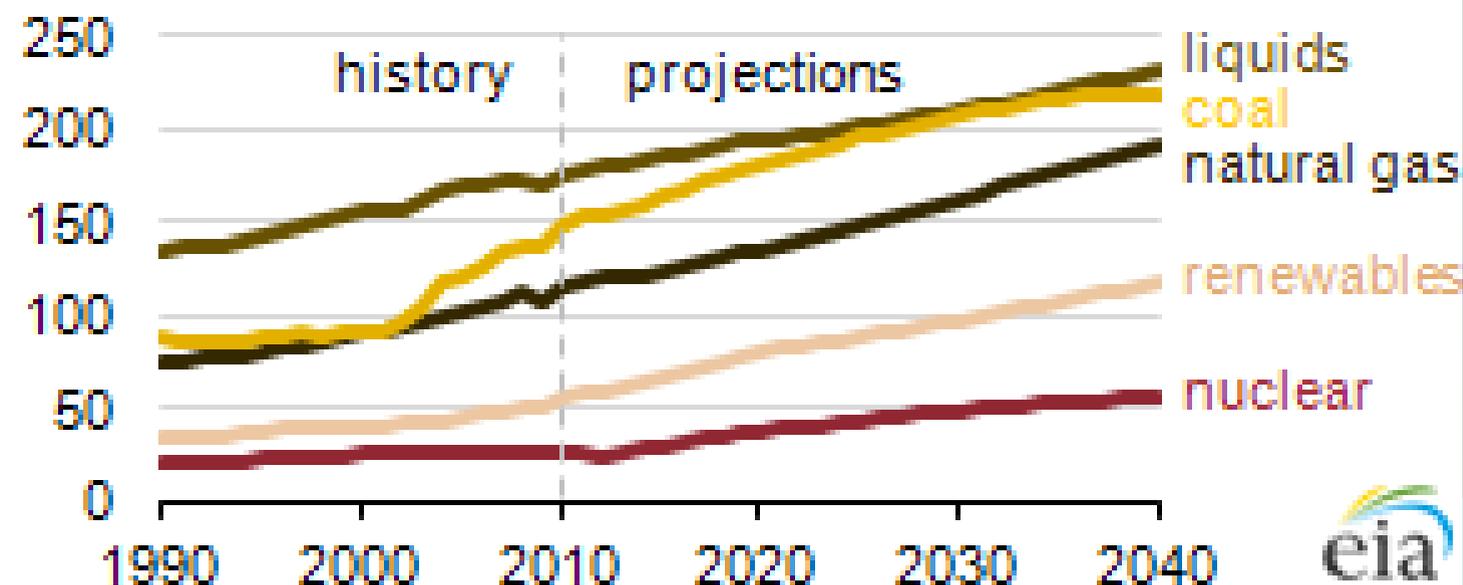
World energy consumption
quadrillion Btu



World energy consumption
quadrillion Btu



World energy consumption by fuel
quadrillion Btu

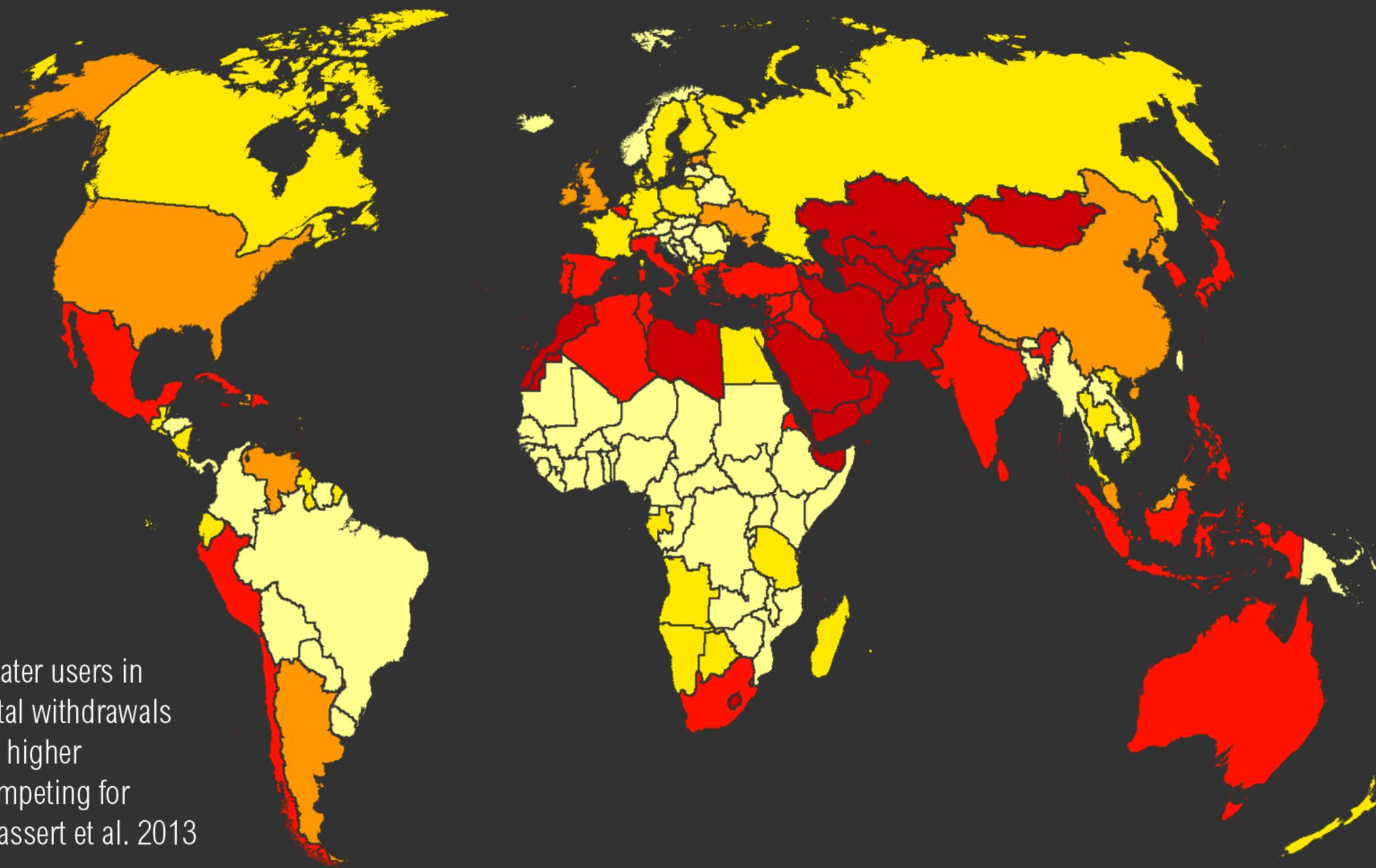


WATER STRESS BY COUNTRY

ratio of withdrawals to supply

-  Low stress (< 10%)
-  Low to medium stress (10-20%)
-  Medium to high stress (20-40%)
-  High stress (40-80%)
-  Extremely high stress (> 80%)

This map shows the average exposure of water users in each country to water stress, the ratio of total withdrawals to total renewable supply in a given area. A higher percentage means more water users are competing for limited supplies. Source: WRI Aqueduct, Gassert et al. 2013



Source: World Resources Institute,



A Highly Connected World



A visualization of Internet connections in the United States. The lines represent connections between routers in major urban areas throughout the country.

Credit: Map by Zina Deretsky, National Science Foundation, adapted from maps by Chris Harrison, Human-Computer Interaction Institute at Carnegie Mellon University (<http://www.chrisharrison.net>).





Critical Societal Challenges

- Energy
- Water
- Food
- Environmental sustainability
- Healthcare
- Education
- Security
- Sustainable economic growth for employment





Motivating Question

Can effective **learning frameworks, platforms and/or nurturing experiential environments** be designed in which targeted participants are stimulated to germinate transformative research ideas and questions to open large opportunities that address important societal needs?





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Germination of Research Ideas for Large
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Sohi Rastegar and Garie Fordyce
Office of Emerging Frontiers and
Multidisciplinary Activities (EFMA)





Seeks EAGER proposals with exploratory ideas to design **learning frameworks, platforms, and/or environments** that enable participants to conceive research ideas and questions with potentially transformative outcomes.





Proposals should focus on the development of key skills and mindsets that will increase the capacity of participants to

- ✓ Identify big opportunities
- ✓ Think creatively
- ✓ Explore novel research formulations
- ✓ Take intellectual risk





Proposers are strongly encouraged to design their exploratory approaches as creatively as possible, building on relevant knowledge from social/behavioral sciences and science of research organizations.

A plan to pilot the approach and test the effectiveness of the approach must be included.





Proposals focusing on research to address a specific societal challenge will not be accepted

For example, a project to develop a new water purification system or a renewable energy solution would not be responsive to this DCL.

The primary outputs **MUST** be learning frameworks, platforms or environments





PI Eligibility

- There is no constraint on the position of a Principal Investigator (PI) within an institution.
- It is critical to demonstrate that the PI is committed to lead a culture of change and is enthusiastic about mentoring early- and/or mid-career faculty, graduate students, and post-doctoral fellows.





Targeted Participants

- Proposals should clearly identify the targeted participants
- The proposed learning frameworks, platforms and/or environments should be designed to match the needs of targeted participants
- The targeted participants may include one or more of the following
 - ✓ Early- and/or mid-career faculty
 - ✓ Graduate students
 - ✓ Post-doctoral fellows
- Participants can come from one or multiple institutions with a variety of academic backgrounds as appropriate





Evaluation Component of Proposal

While it is not viable to demonstrate the long-term outcome of proposed projects in 12 months, submitters must have a plan to assess and document, in a meaningful way, the interim effectiveness of proposed approaches on:

- The participants in terms of how their ability and interest are enhanced in germinating research ideas and questions to open large opportunities that address important societal needs
- How likely it is for the proposed approaches to be scalable and adaptable beyond the institutions involved in the study



Submission



EAGER proposals in response to this Dear Colleague Letter must meet the requirements of NSF's Grant Proposal Guide (see Section II.D.2 at http://www.nsf.gov/pubs/policydocs/pappguide/nsf15001/gpg_2.jsp#IID2) and the review criteria of the program to which they are submitted.

As noted in the GPG, EAGER is a funding mechanism for supporting exploratory work in its early stages on untested, but potentially transformative, research ideas or approaches.

The title of the proposal must start with "EAGER Germination:"





Deadline, Budget, and Review

- **Proposals Due:** **January 19th, 2016**; 5pm submitters' local time,
- **Project Duration:** 1 year
- **Total Budget:** Up to \$100,000 per award
- **No. of Awards:** A total of 10-12 awards are expected
- **Travel:** PI is encouraged to request travel budget for PI and key associates to visit NSF for project review
- **Proposal Length:** 5-8 pages
- **Review:** Applicants will be informed if their proposal is to be externally reviewed



Q: Is eligibility for this program limited to Engineering Schools?

A: While submissions in response to this DCL are not limited to Engineering Schools, the DCL is designed to foster development of learning platforms to stimulate transformative research ideas and questions that address important societal needs. Engineering research, and the active engagement of engineering researchers and educators, is likely to be relevant for addressing these societal challenges.





Q: Is this DCL intended only for senior faculty, or may junior faculty submit a proposal?

A: Any faculty member or administrator may submit a proposal as long as they have access to the necessary resources, and targeted participants, to successfully develop and test a novel learning platform of appropriate scope.





Q: Is it permissible for the PI to be from a non-profit or for-profit company rather than from a university?

A: Yes - as long as they have access to the necessary resources, and targeted participants, to successfully develop and test a novel learning platform of appropriate scope.





Q: Does the project team need to consist of graduate students and early-mid career researchers?

A: The research team need not include graduate students and early-mid career researchers. However, the research participants in the learning framework must include one or more of the following: early- and/or mid-career faculty, graduate students, and/or post-doctoral fellows.



Q: Can I submit an EAGER that proposes fundamental engineering research?

A: No. Research proposed in response to this DCL should not have the primary goal of solving an engineering or science challenge. It should instead focus on designing learning frameworks, platforms and/or environments that will enable participants to conceive research ideas and questions with potentially transformative outcomes.



Q: Must the proposal focus on educating participants to tackle research questions in science and/or engineering?

A: Solutions for large interdisciplinary challenges are highly likely to involve science and engineering.





Q: Do you anticipate another proposal deadline in January 2017?

A: We do not have a specific plan for next year at this time and will evaluate after this round.





One Page Concept Paper

Interested investigators are encouraged to contact Mr. Garie Fordyce at gfordyce@nsf.gov with a one-page concept paper explaining the core idea of their project prior to submission





Remember the Motivating Question

Can effective **learning frameworks, platforms and/or nurturing experiential environments** be designed in which targeted participants are stimulated to germinate transformative research ideas and questions to open large opportunities that address important societal needs?





Address Queries to:

- Garie Fordyce gfordyce@nsf.gov
- Sohi Rastegar srastega@nsf.gov



Questions?