

Grand Challenges

U.S.A. 2008 Grand Engineering Challenges (National Academy of Engineering)

- Make solar energy affordable
- Provide energy from fusion
- Develop carbon sequestration methods
- Manage the nitrogen cycle
- Provide access to clean water
- Restore and improve urban infrastructure
- Advance health informatics
- Engineer better medicines
- Reverse-engineer the brain
- Prevent nuclear terror
- Secure cyberspace
- Enhance virtual reality
- Advance personalized learning
- Engineer the tools for scientific discovery

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The Copenhagen Consensus – 2008

	Challenge	Solution
1	Malnutrition	<ul style="list-style-type: none"> a. Micronutrients supplements for children (vitamin A & zinc) b. Micronutrient fortification (iron and salt ionization) c. Biofortification d. Deworming & other nutrition programs at school e. Community-based nutrition promotion
2	Trade	<ul style="list-style-type: none"> • The Doha development agenda
3	Diseases	<ul style="list-style-type: none"> a. Expanded immunization coverage for children b. Heart attack acute management c. Malaria prevention & treatment d. Tuberculosis case finding & treatment e. HIV combination prevention f. Improving surgical capacity at district hospital level g. Tobacco tax
4	Education	<ul style="list-style-type: none"> a. Deworming & nutrition programs at school b. Lowering the price of schooling c. Conditional cash transfers
5	Women	<ul style="list-style-type: none"> a. Increase and improve girls' schooling b. Provide support for women's reproductive role c. Microfinance
6	Global Warming	<ul style="list-style-type: none"> a. R&D in low-carbon energy technologies b. R&D and mitigation c. Mitigation only
7	Water	<ul style="list-style-type: none"> a. Bio-sand filters for household water treatment b. Rural water supply c. Total sanitation campaign d. Large, multipurpose dam in Africa
8	Conflicts	<ul style="list-style-type: none"> • Peace-keeping in post-conflict situations
9	Air Pollution	<ul style="list-style-type: none"> a. Improved stove intervention b. Inspection and maintenance of diesel vehicles c. Low sulfur diesel for urban road vehicles d. Diesel vehicle particulate control technology

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[James Martin](#) – [The Meaning of the 21st Century](#) – Global Challenges of this Century, descriptions are edited versions from Chapter 1 of *The Meaning of the 21st Century* except where quoted directly.

	Challenge	Description
1	Global Warming	Leads to severe climate change.
2	Excessive Population Growth	World population heading to 9 billion people by 2050
3	Water Shortages	Rivers and Aquifers are drying up. Agricultural regions are shifting.
4	Destruction of Ocean Life	Only ten percent of edible fish remain in the oceans.
5	Mass Famine in Some Countries	Poorest countries harmed by climate change and rise in the price of grains.
6	Spread of Deserts	Global warming is accompanied by expanding deserts
7	Pandemics AIDS	AIDS continues to spread
8	Extreme Poverty	2 to 3 billion people live in extreme poverty
9	Shanty City Growth	Youth in these cities have very limited opportunity to integrate into a modern society.
10	Unstoppable Global Migrations	People migrate to where the jobs are.
11	Non-State Actors with Extreme Weapons	Technology advances continues to enable others to develop these weapons capabilities.
12	Violent Religious Extremism	Violence continues to be justified in the name of religion.
13	Runaway Computer Intelligence	AI researchers generally expect emergence of computer intelligence in this century.
14	War that could end Civilization	“A global war like World War I or II, conducted with today’s vast number of nuclear weapons and new biological weapons, could end civilization.”
15	Risk to Homo Sapiens’s Existence	Biotechnology and genetic engineering are double-edged tools of science, low but perceptible risks to accompany the opportunities.
16	A New Dark Age	“A global cocktail of intolerable poverty and outrageous wealth, starvation, mass terrorism with nuclear/biological weapons, world war, deliberate pandemics and religious insanity, might plunge humanity into a worldwide pattern of unending hatred and violence – a new Dark Age.”