

# Pavement LCA – Where Do We Go from Here!!



Federal Aviation  
Administration



Presented to: Pavement Life Cycle Assessment Symposium - 2017  
Illinois Center for Transportation, Champaign, IL

By: Navneet Garg, Ph.D.  
NAPMRC Program Manager  
Federal Aviation Administration (FAA)

Date: April 13, 2017

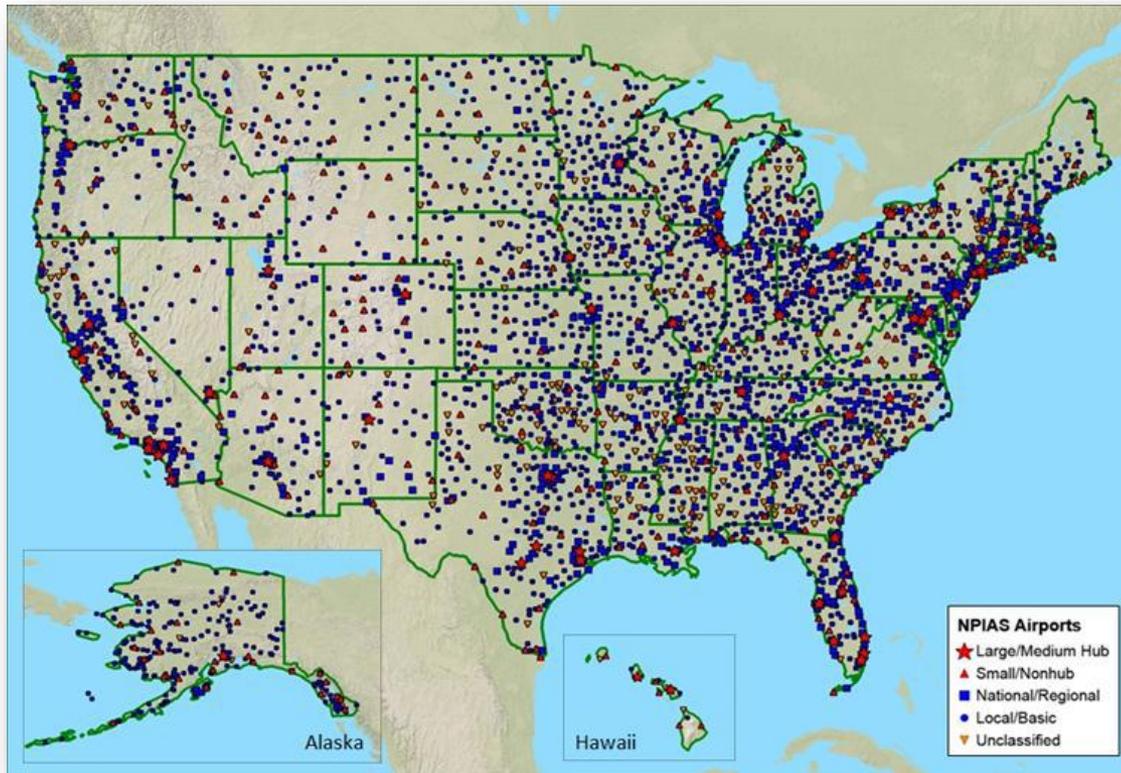


# Outline

- Introduction
- Where are we?
- Where do we go from here!



# United States Airport System



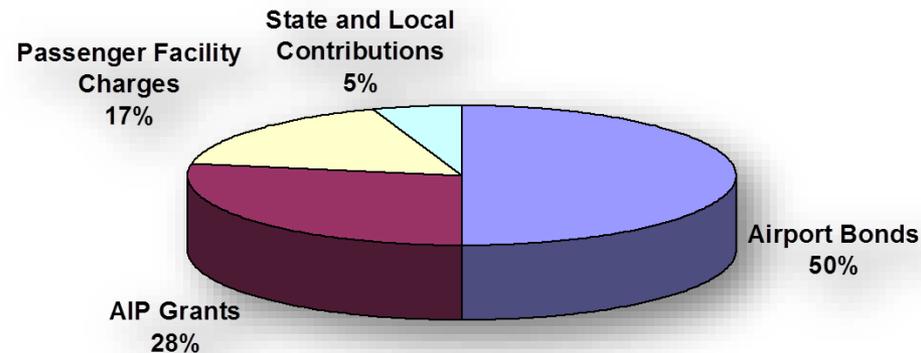
***National Plan of Integrated Airport Systems (NPIAS)***

- Over 600 million passenger enplanements annually at over 13,000 airports.
- 3,400 airports in the NPIAS (as of September 2014).

# Airport Funding Sources

- **Airport Improvement Program (AIP) Grants**
  - \$3 to 4 Billion per year
  - FAA Advisory Circulars (ACs)
  - Eligibility Requirements
- Passenger Facility Charges
- Airport bonds
- Airport revenue (pays off airport bonds)
- State & local government contributions

Sources of Airport Funding



Source: GAO Report GAO-07-885 AIRPORT FINANCE Observations on Planned Airport Development and Funding Levels and the Administration's Proposed Changes in the Airport Improvement Program

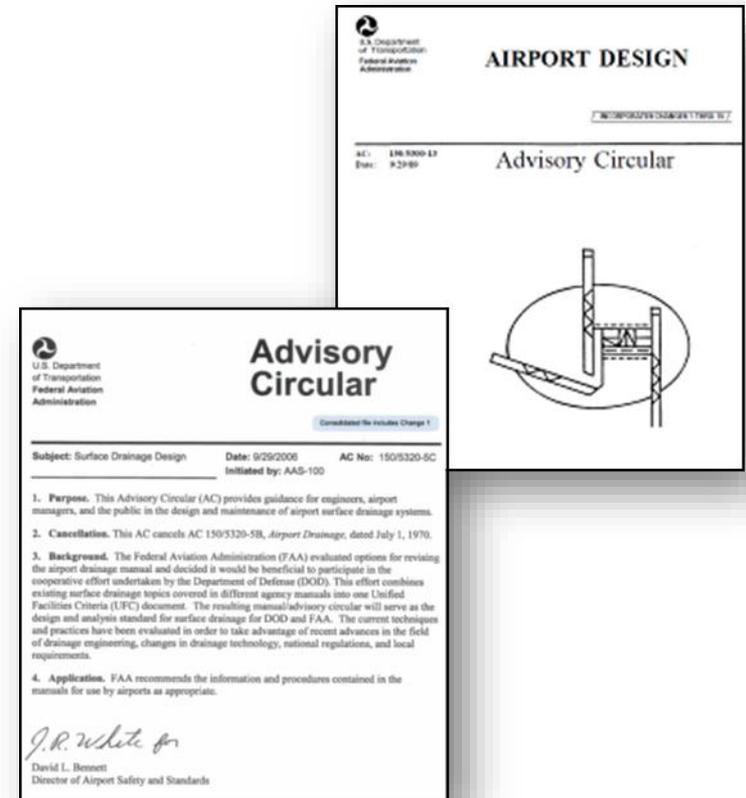
# Outline

- Introduction
- Where are we?
- Where do we go from here!



# Advisory Circulars

- FAA's Office of Airports (ARP-1) maintains more than 100 advisory circulars (ACs) that provide guidance on airport development.
- To be eligible to receive the AIP grant, all project work must meet standards set in these ACs.
- All areas of airport development:
  - Airport planning and design.
  - Airport lighting and marking.
  - Airport pavement design and construction.
  - Runway safety.
  - Aircraft rescue and fire fighting (ARFF).
  - Wildlife hazard mitigation.
  - **PLCA??**



# Recycled Materials

- Item P-219 Recycled Concrete Aggregate Base
- FAA Specifications P-401/403 “Plant Mix Bituminous Pavements”
  - **RAP should not be used for surface mixes, except on shoulders.** It can be used very effectively in lower layers or for shoulders. Engineer to specify the maximum percentage of reclaimed asphalt allowed in the mix. The amount of RAP shall be limited to 30%, as long as the resulting recycled mix meets all requirements that are specified for virgin mixtures. The Contractor may obtain the RAP from the job site or an existing source.
- **Very limited use – lack of performance data**



# ACRP

REPORT 42

AIRPORT  
COOPERATIVE  
RESEARCH  
PROGRAM

## Sustainable Airport Construction Practices



TRANSPORTATION RESEARCH BOARD  
OF THE NATIONAL ACADEMIES

Sponsored by  
the Federal  
Aviation  
Administration

# ACRP

## SYNTHESIS 10

AIRPORT  
COOPERATIVE  
RESEARCH  
PROGRAM

## Airport Sustainability Practices



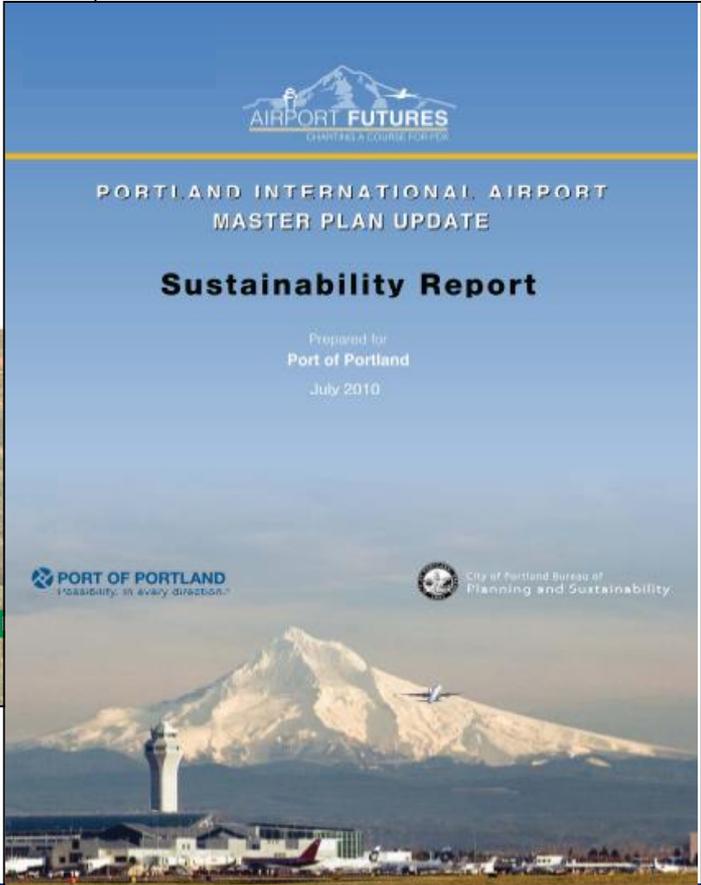
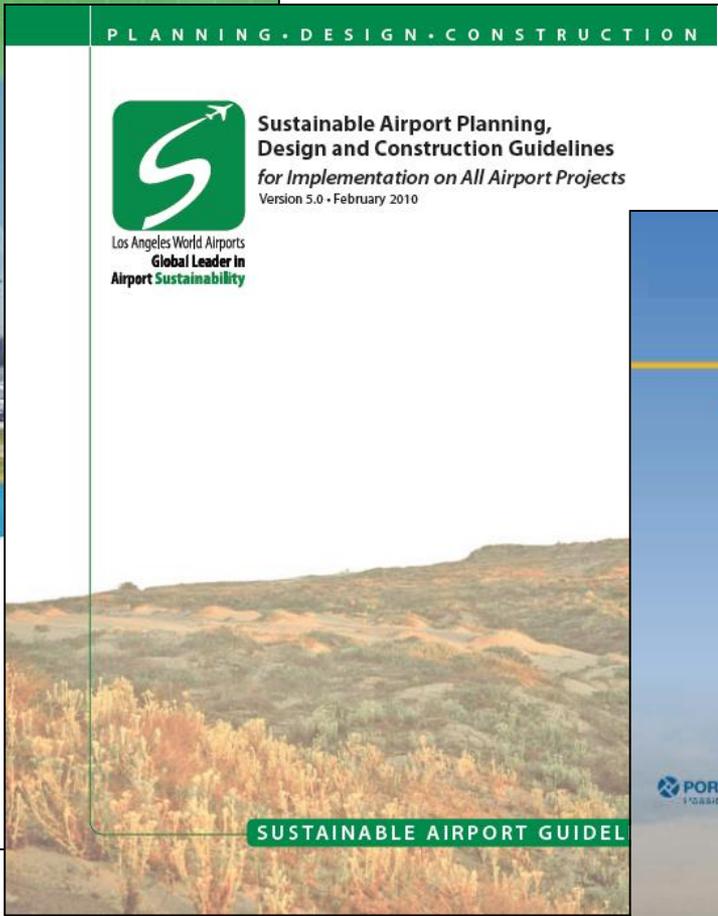
# SUSTAINABLE AVIATION RESOURCE GUIDE



Planning, Implementing and Maintaining  
a Sustainability Program at Airports

SAGA  
Sustainable Aviation Guidance Alliance

A PRODUCT OF THE SUSTAINABLE AVIATION GUIDANCE ALLIANCE  
(SAGA)



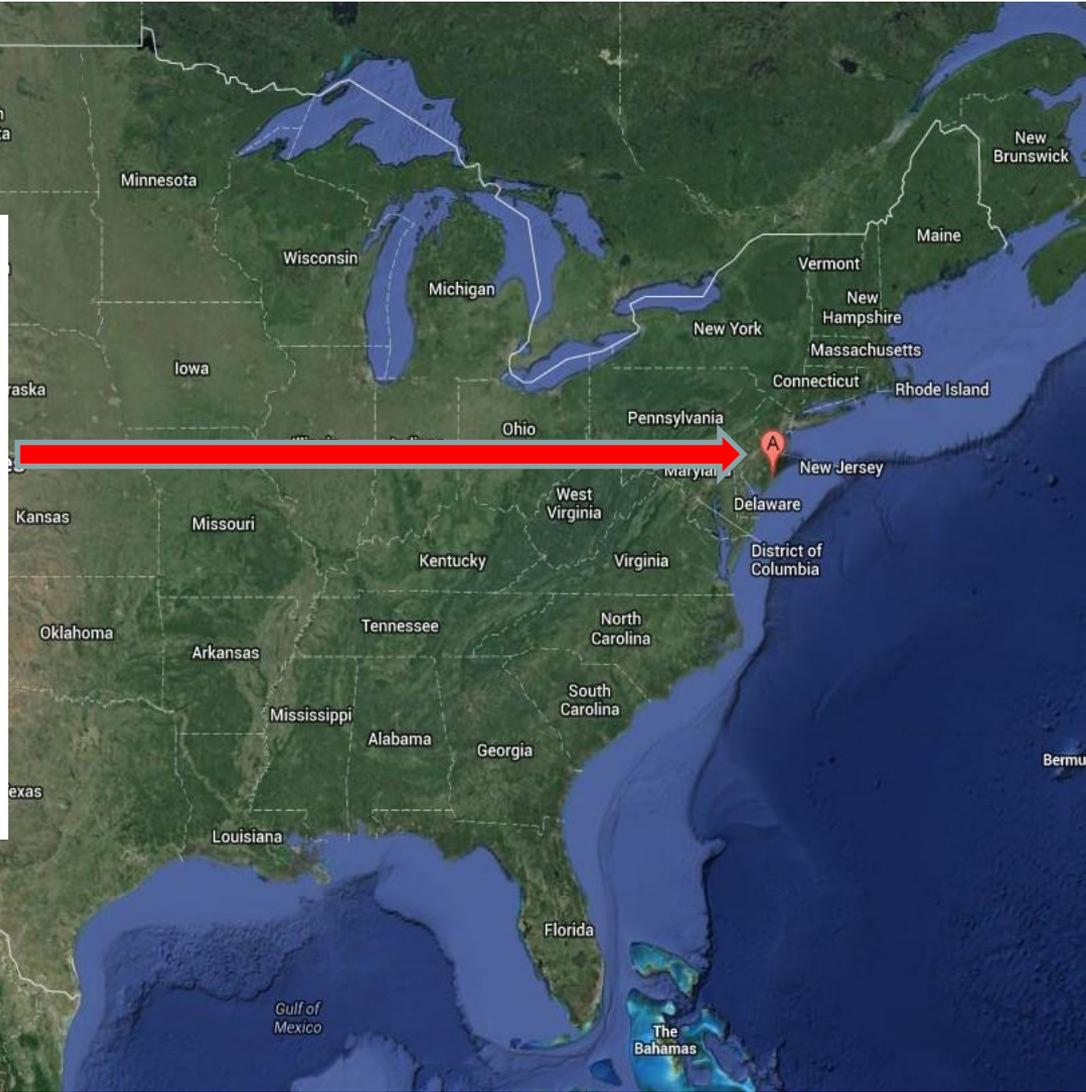
# Outline

- Introduction
- Where are we?
- Where do we go from here!



# FAA Airport Technology R&D Program

- Research conducted at the FAA William J. Hughes Technical Center, Atlantic City, NJ, USA.
- Sponsor: FAA Office of Airport Safety and Standards (AAS100), Washington, DC.
- Provide support for development of FAA pavement standards (Advisory Circulars).







## National Airport Pavement Test Facility (NAPTF)

Pavement LCA – Where Do We Go from Here!!

April 13, 2017



Federal Aviation  
Administration

13



Pavement LCA – Where Do We Go from Here!!

April 13, 2017



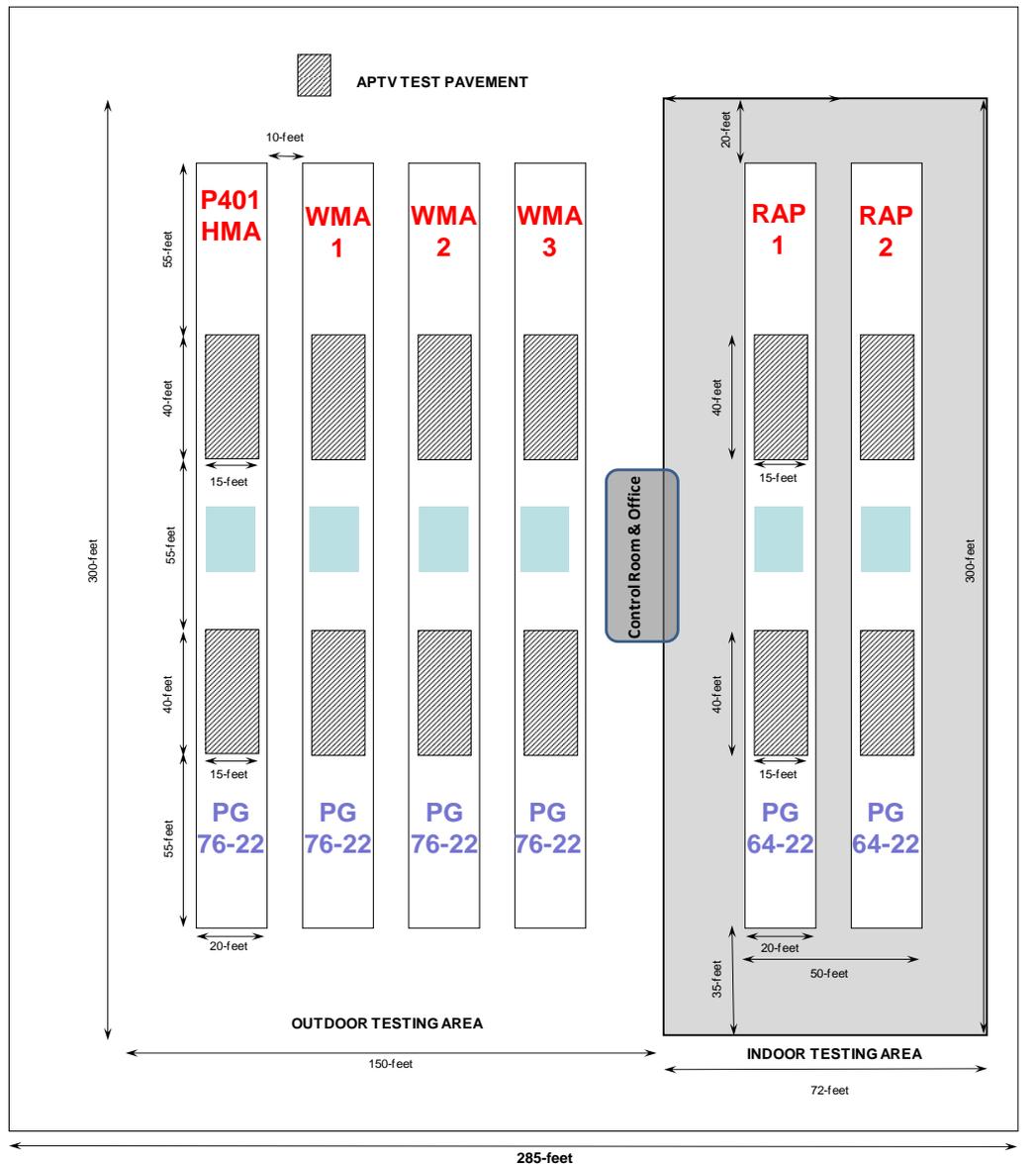
Federal Aviation Administration

**MATERIAL**

**RUTTING**  
(test at high temperature)

**CRACKING**  
(test during winter)

**Tire Pressure**  
**254 psi**



**NAPMRC**  
**Test Cycle-2**  
**(TC-2)**

TOTAL AREA = 102,600 sq. feet (2.36 acres)



# Full-Scale APT

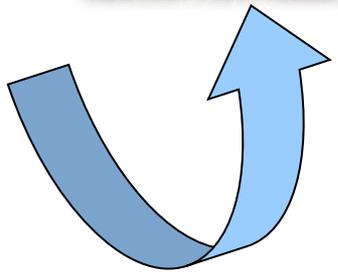
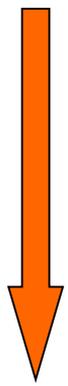
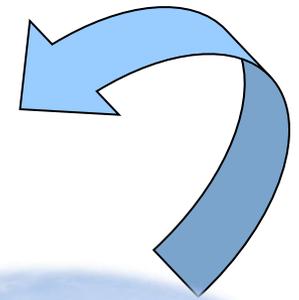
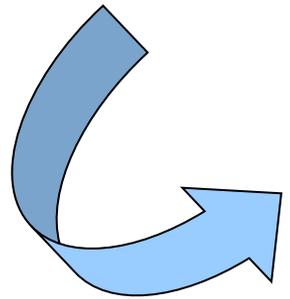
- Generate performance data for recycled/sustainable materials under aircraft loading.
- Develop standards/specifications for recycled/sustainable materials.

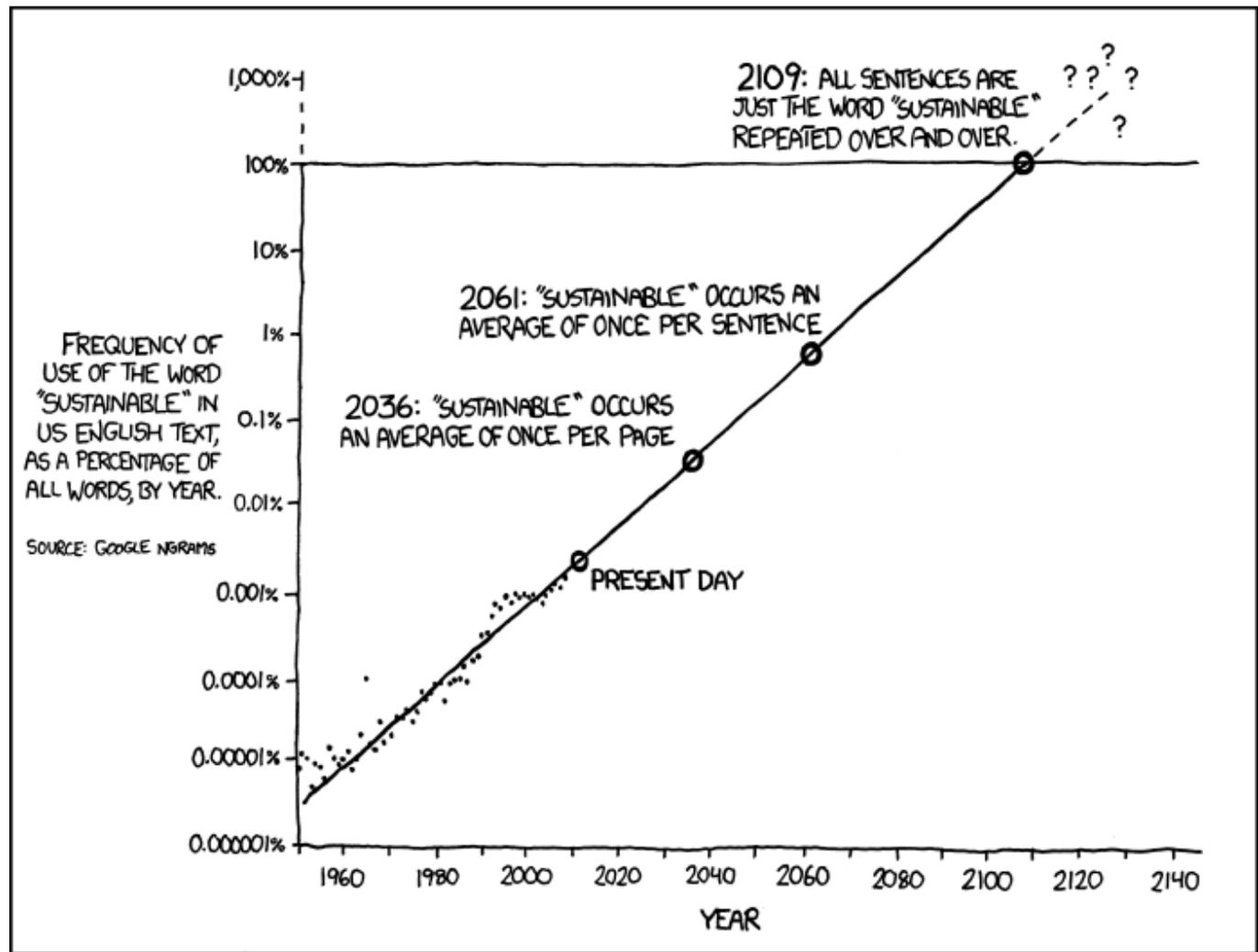


# Pavement LCA (research grant with UC Davis)

- An airfield LCA framework and guidelines are under development that will consider environmental impacts in decision making.
- The scope is limited to airside civil infrastructure.
- The guidelines include recommendations for all phases of LCA, including goal and scope definition, life cycle inventory development, impact assessment, interpretation and critical review, and reporting.
- Guidelines will be updated as experience is gained from airfield LCA studies.







THE WORD "SUSTAINABLE" IS UNSUSTAINABLE.

(<https://imgs.xkcd.com/comics/sustainable.png>)

**Navneet Garg, Ph.D.**  
**Program Manager , NAPMRC**  
**Airport Technology R&D Branch**  
**Navneet.Garg@faa.gov; (609)485-4483**  
**<http://www.airporttech.tc.faa.gov>**

