

The Bio-based Economy



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A globe of the Earth is the central focus, held gently by several hands of different skin tones. The hands are positioned around the globe, with some resting on top and others supporting it from the sides and bottom. The background is a clear blue sky with scattered white clouds. The text is overlaid on the globe and sky.

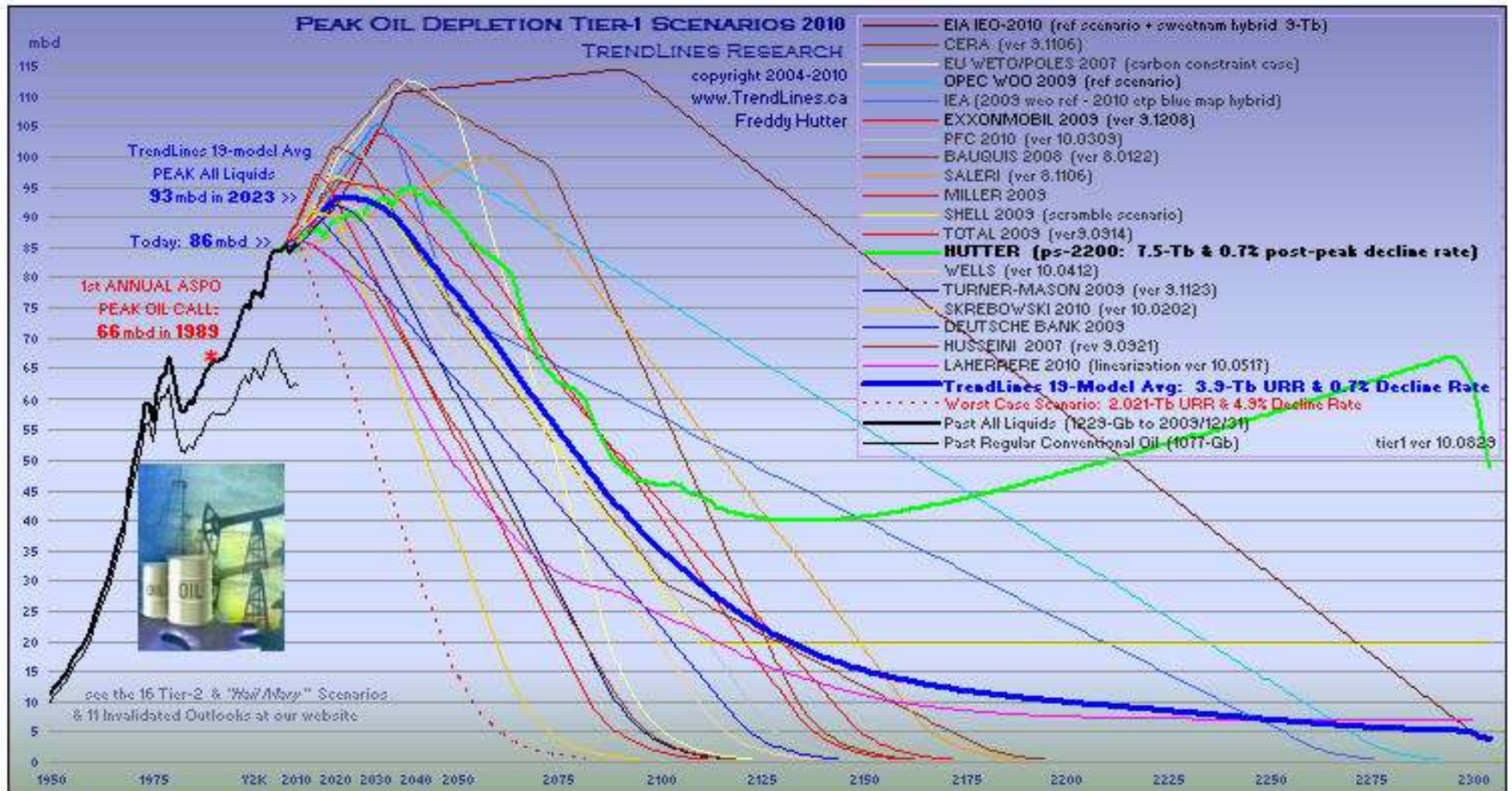
Today's challenges

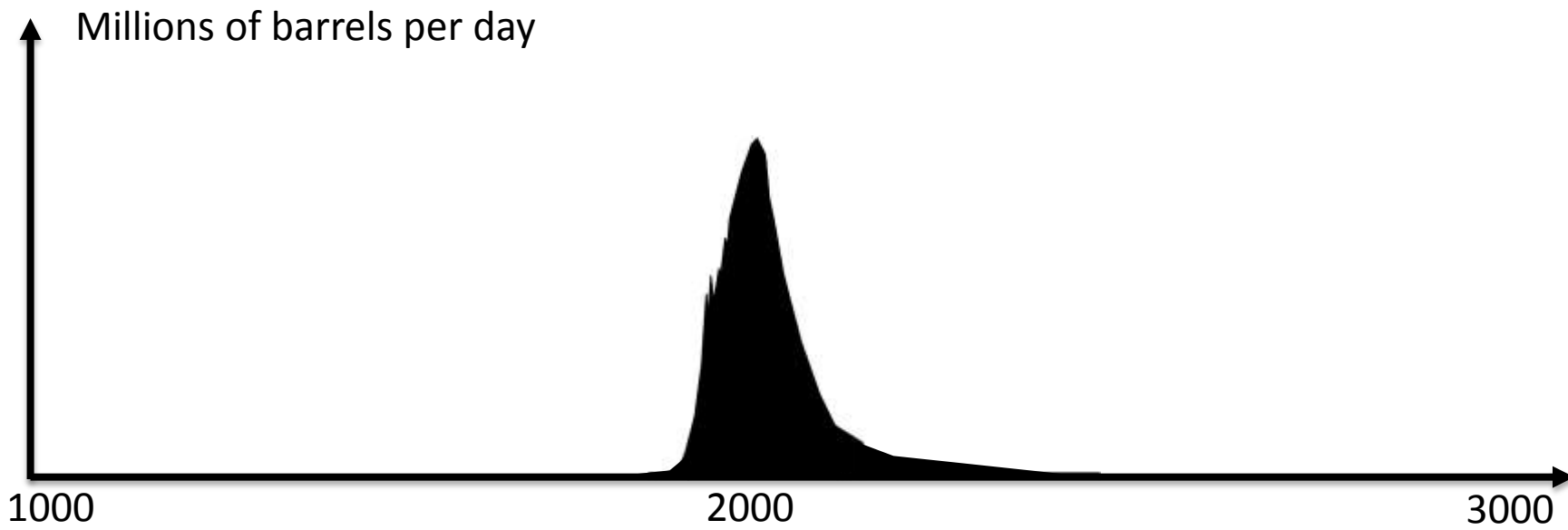
- ❑ Food and feed security

- ❑ Energy supply security

- ❑ Sustainable development and environment protection

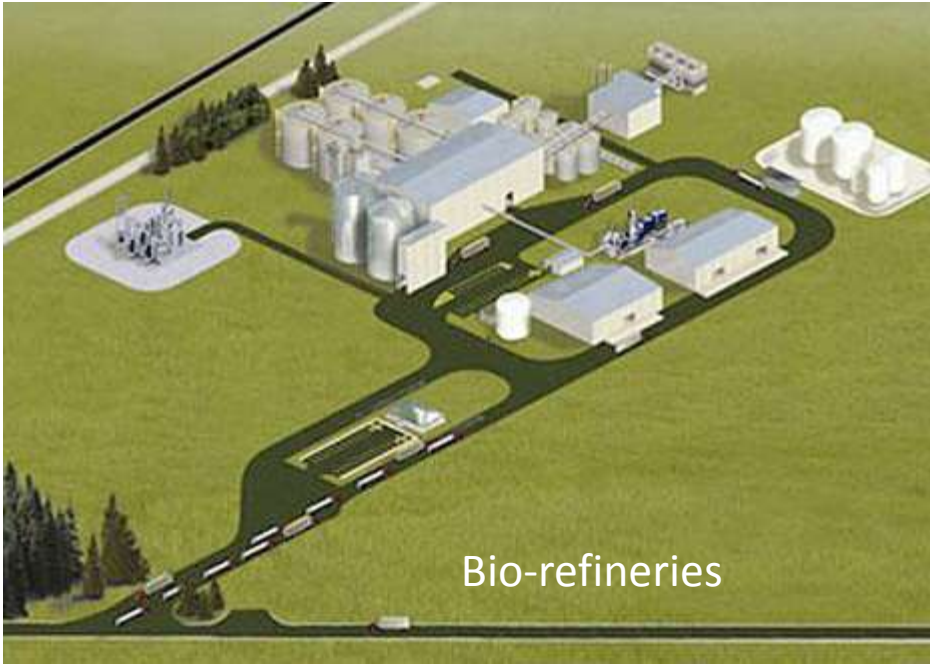
We do not know when exactly the fossil fuels will be depleted but one thing is certain: they will not last for ever





A brief moment in history





Bio-refineries

How the
future will
look like?



Photovoltaics



Wind energy

Bioenergy along with solar energy can provide solutions

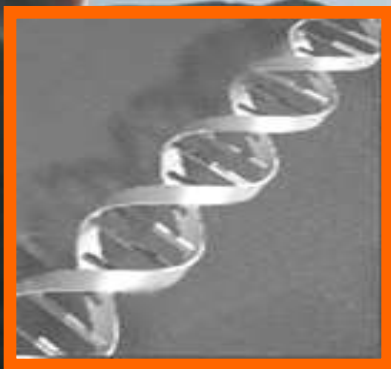
Past

Old-line biomass processing uses harsh chemicals and conditions – not economical

Present

Biotechnology Revolution

Genomics and proteomics are **transforming** biomass conversion processes and conventional manufacturing processes = new processes and products



Biofuels are here



Βιοαέριο, 2003



100% Βιοαιθανόλη,
1990/98



Κυψέλες καυσίμων,
2004



Βραζιλία 1997/2004

2nd generation biofuels



Algae
bioreactors

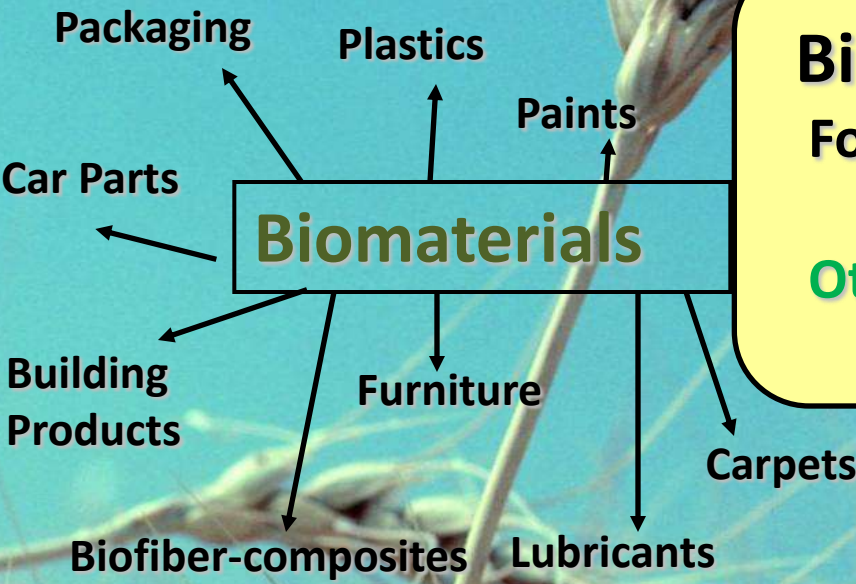
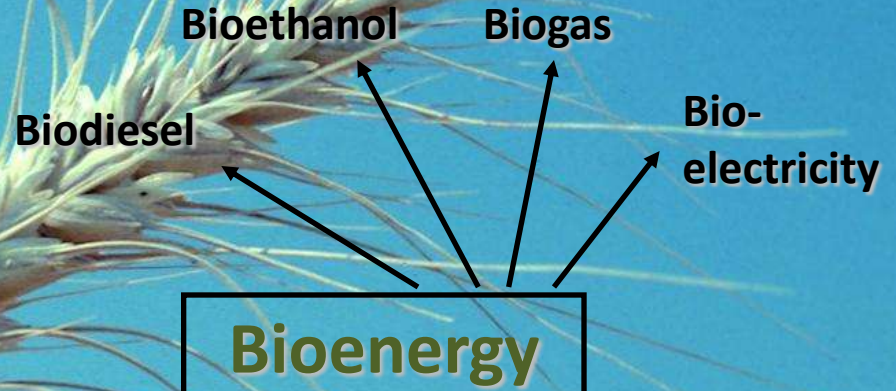
Bio-based economy

A close-up photograph of a cornfield. The image shows several rows of corn plants with bright green, pointed leaves. The background is a clear, bright blue sky. The perspective is from within the field, looking slightly upwards and across the rows.

- **Bio-based economy is NOT just about biofuels**
- **Bio-based economy is NOT just about biotechnology**
- **There is much more value in biomass**

Bio-economy

**Gift of
Agriculture**



Fine chemicals, e.g. cosmetics



Innovative bioprocesses
to produce **isoprene**
from renewable raw materials,
to manufacture **tyres**

Abundant Cellulose Sources

- Corn Stover
- Wheat Straw
- Barley Straw
- Sugar Beet Tops
- Alfalfa
- Switch Grass
- Saw Dust



Natural fibers



Natural Fibers – automotive opportunities



- ❑ 27 components
- ❑ 43 kg bio-parts:
 - door & pillar inners,
 - head liner,
 - rear cargo shelf & trunk components,
 - thermal insulation & isolation mats

Mercedes has a goal to double the amount from 43 kg to 86 kg



Bio-engineering:
Apply engineering principles on living organisms and systems

Biomass for the production of plastic for cups, bags, films and textiles



Bio-engineering



Biobased films

- Environmental protection
- Maintain and improve agricultural productivity

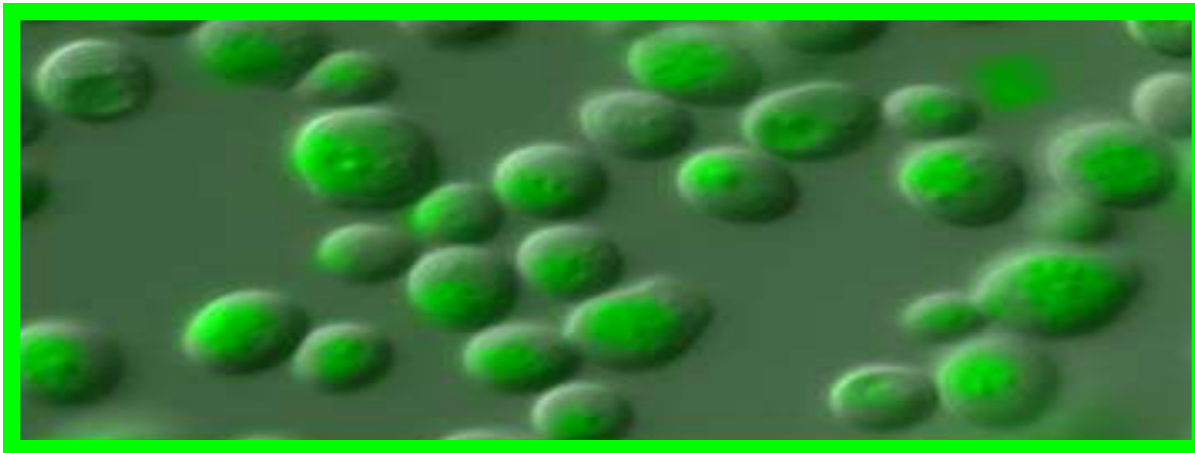
Bio-technology:
Enzymes are used to
make millions of pairs
of stonewashed jeans
each year, making
huge energy savings



Bio-technology:
Enzyme-containing
washing powders, clean
clothes at lower
temperatures resulting
in huge energy savings

Industrial Biotechnology

- The application of life sciences to conventional manufacturing and synthesis processes – use of genetically engineered bacteria, yeasts and plants
- Results in:
 - lower production costs , more profit
 - less pollution
 - resource conservation

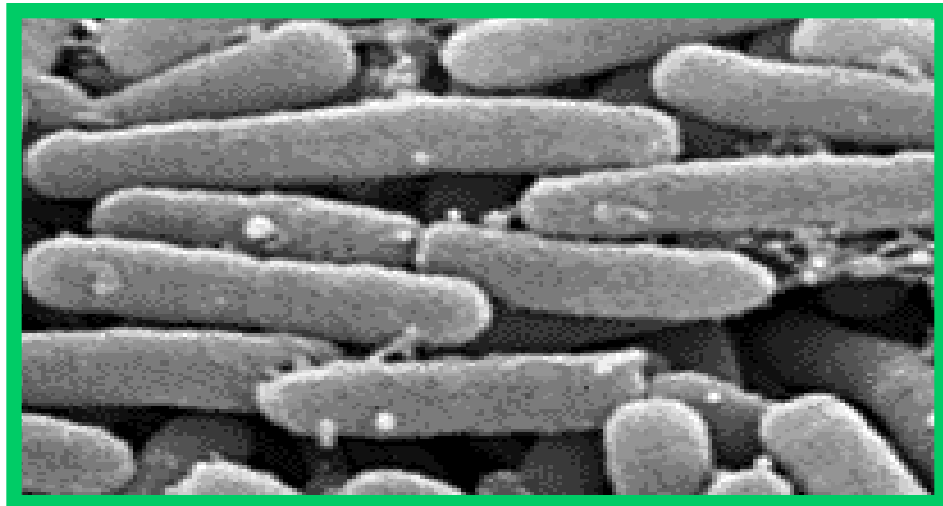


Environmental Biotechnology

- **Using life sciences to clean up pollution**

Bioremediation using:

- **microbes**
- **enzymes**






Biobased Products & Biobased Energy are better for our Environment



- **Use of renewable resources** as feedstocks – help conserve other resources
- **Carbon neutral** – no contribution to global warming
- Products and byproducts are **biodegradable**

Bio-based economy: Not when, but how quickly!

- Bio-based economy is inevitable
- But, true Bio-based economy is still a long way to go
- Ongoing role for traditional fossil fuel based energy and materials and chemistry
- Considerable challenges to be overcome; research is a major duty of the universities

- 
- Creation of a research network between US and GR institutions on
 - Food science and technology
 - Bio-systems engineering,
 - Biotechnology and
 - Environment

- Can be coordinated from the Agricultural University of Athens

Agricultural University of Athens

The background of the slide features a photograph of a large, multi-story building with a classical architectural style, including columns and a pediment. A tall, slender cypress tree stands prominently in the foreground, partially obscuring the building. The scene is set outdoors with a clear sky and some lower vegetation in the distance.

- **Departments**

- Crop Science

- Animal Science

- Agricultural Biotechnology

- Food Science and Technology

- Natural Resources and Agricultural Engineering

- Economics and Rural Development

Agricultural University of Athens



- What we do
 - Food and feed production
 - Food processing technology
 - Biotechnology
 - Biomaterials and energy
 - Natural resources and environment
 - Bio-engineering for life
 - Economics



beautiful
campus





beautiful
campus



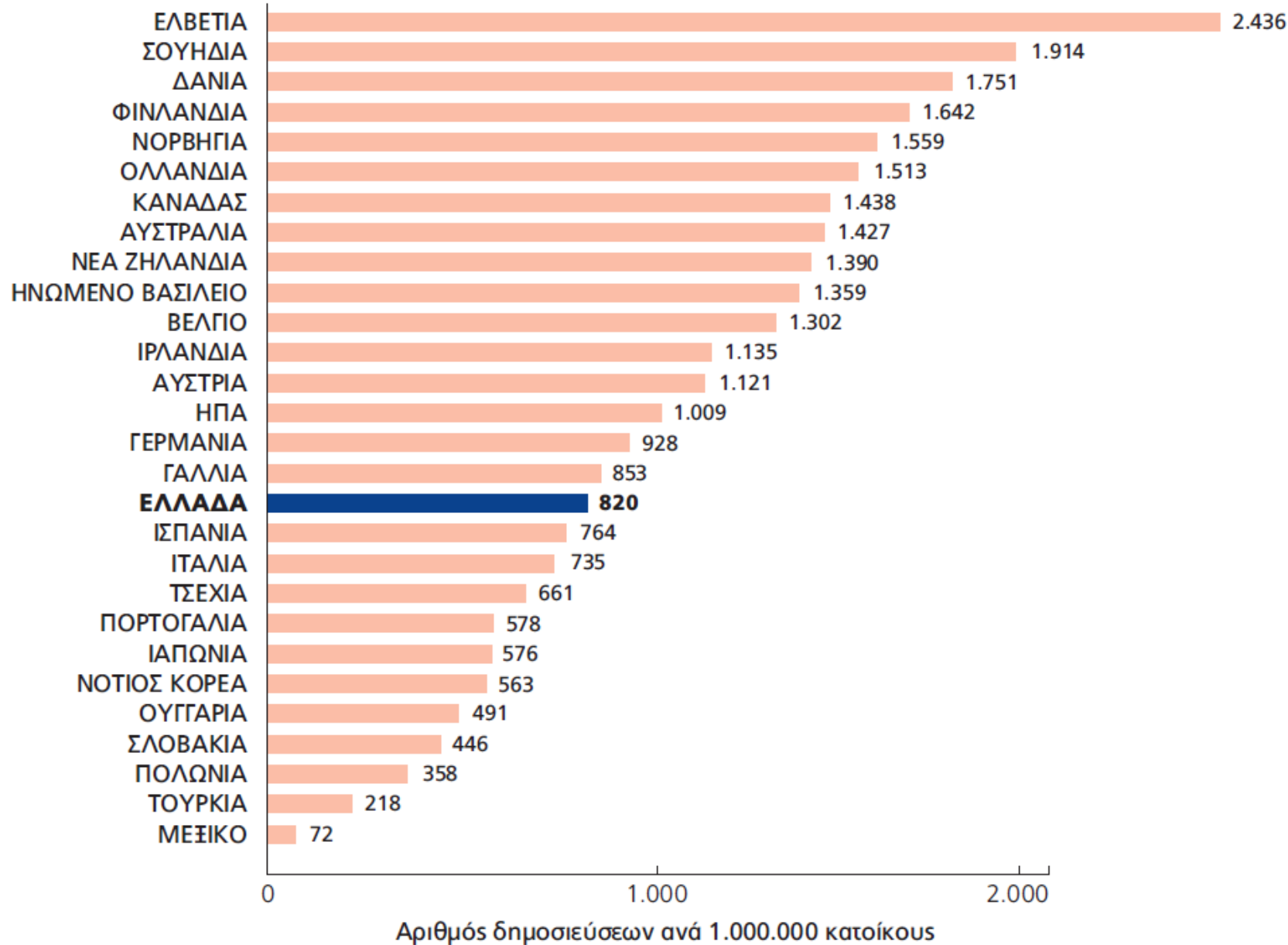
Agricultural University of Athens



- 25 ha campus at the centre of Athens
- 60 buildings
- 10 large amphitheatres
- 26 smaller teaching rooms
- 42 laboratories
- Library
- Agricultural museum
- 200 faculty staff
- 220 researchers

Agricultural University budget



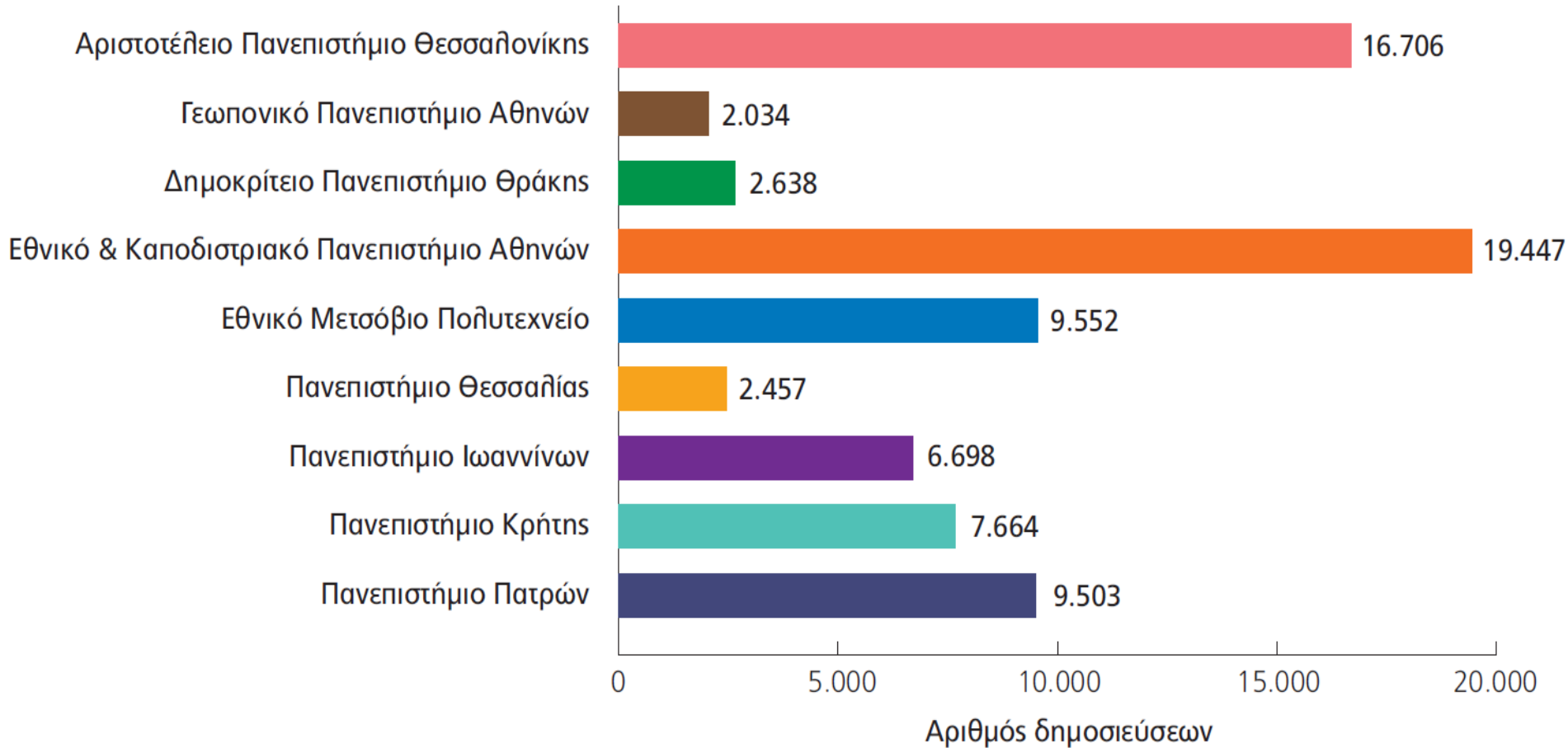


Διάγραμμα 2.5: Αριθμός δημοσιεύσεων των χωρών μελών του ΟΟΣΑ ανά 1.000.000 κατοίκους, για το έτος 2007.

Δεν εμφανίζονται δεδομένα για την Ισπανία και το Λουξεμβούργο λόγω του πολύ μικρού αριθμού των δημοσιεύσεών τους (πιο λίγες από 1.000).

Πηγές: OECD: Main Science and Technology Indicators 2009/1, Thomson Reuters, NSI 1981-2008.

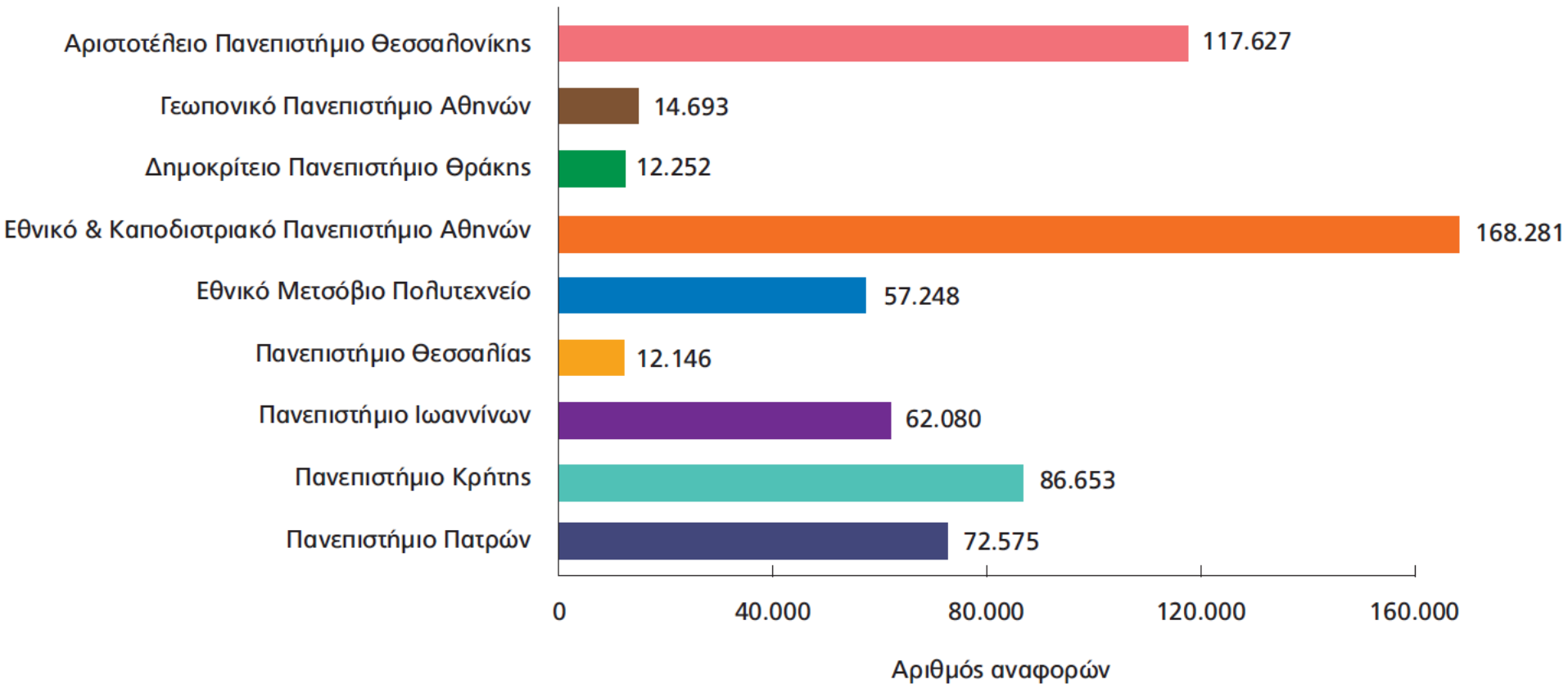
Greek Universities



Διάγραμμα 6.1: Συνολικός αριθμός δημοσιεύσεων, για κάθε Πανεπιστήμιο, για την περίοδο 1993-2008.

Πηγή: Thomson Reuters, NCR Greece 1993-2008.

Greek Universities

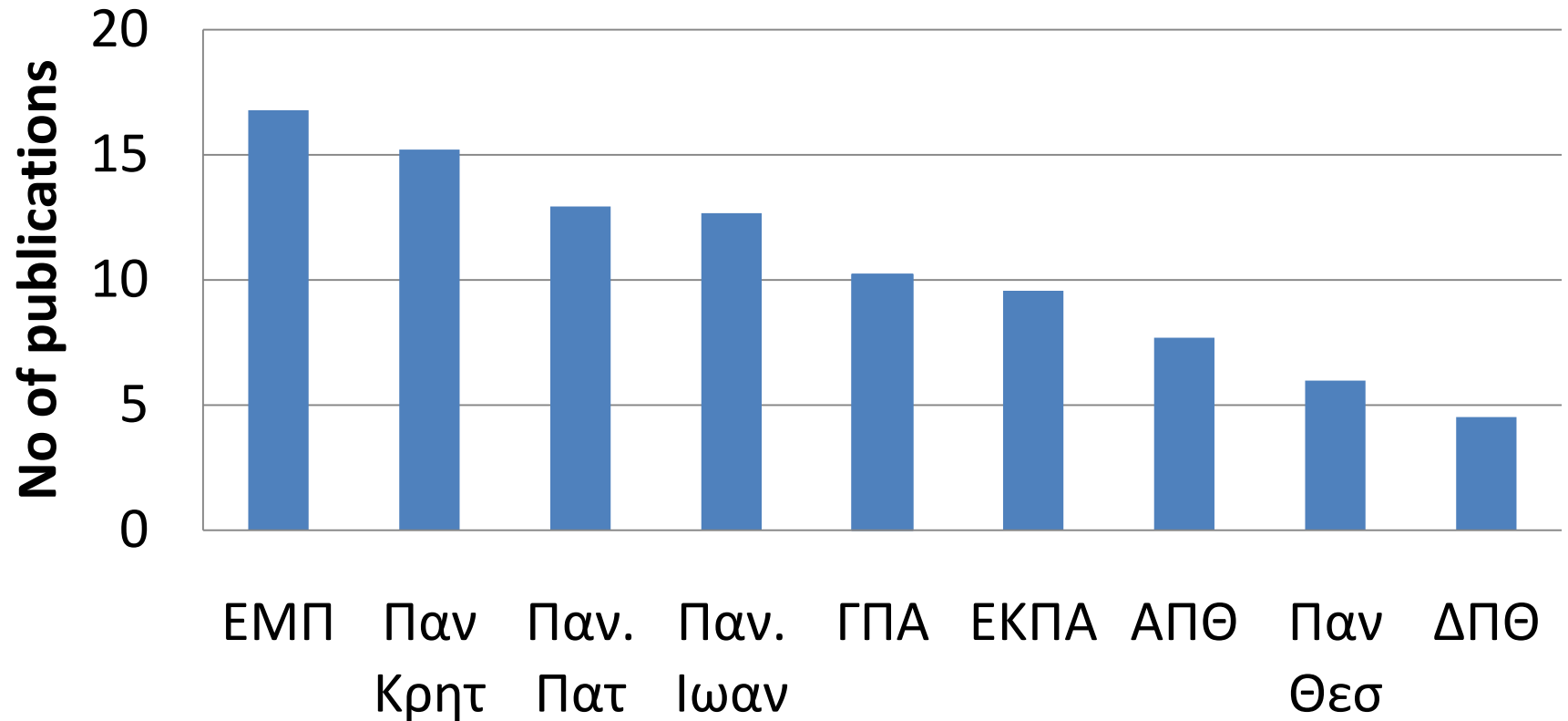


Διάγραμμα 6.6: Συνολικός αριθμός αναφορών στις δημοσιεύσεις κάθε Πανεπιστημίου, για την περίοδο 1993-2008.

Πηγή: Thomson Reuters, NCR Greece 1993-2008.

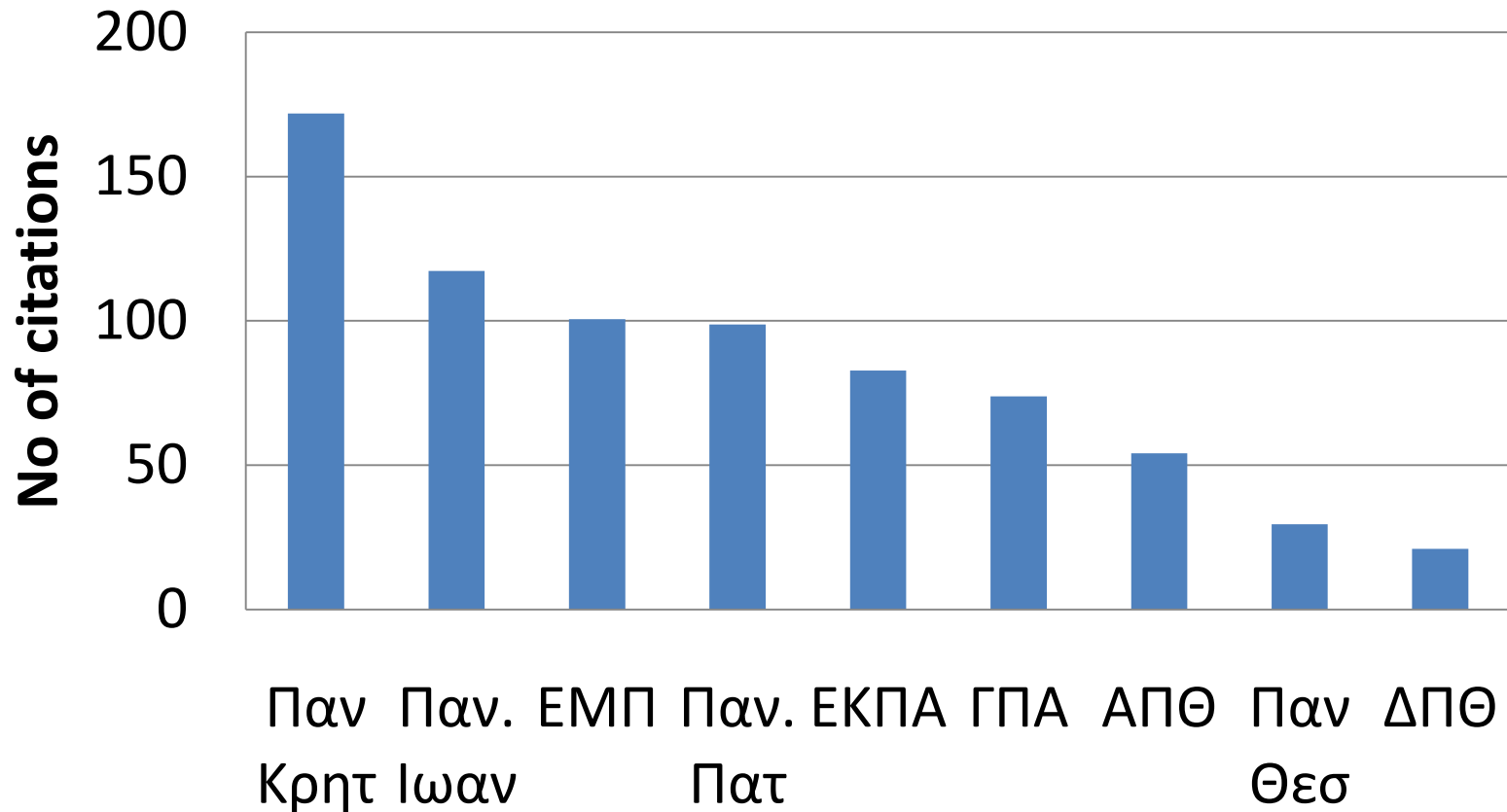
Greek Universities

**No of publications per faculty member for
the period 1993-2008**



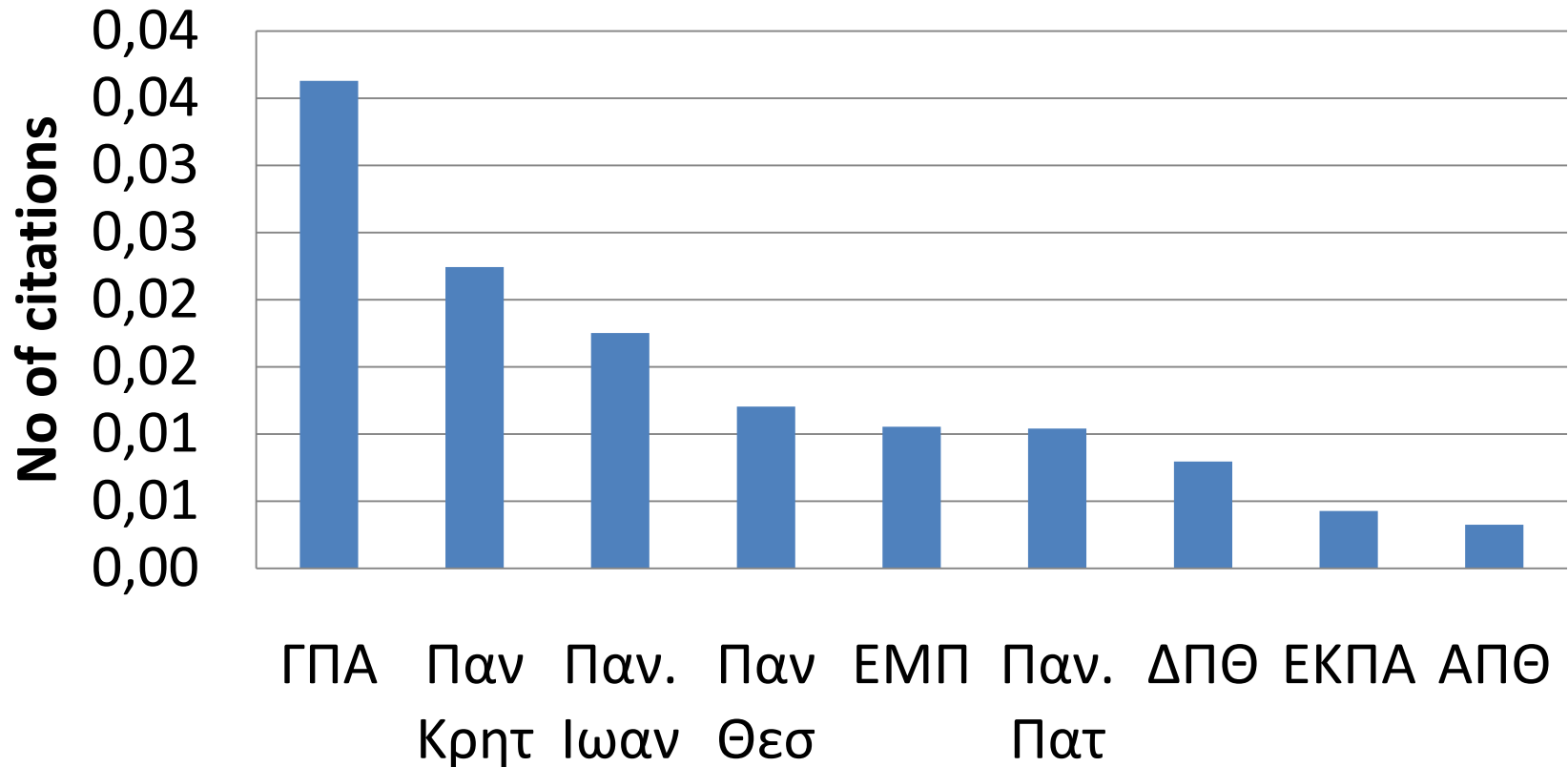
Greek Universities

No of citations per faculty member for
the period 1993-2008



Greek Universities

No of citations per faculty member and per publication for the period 1993-2008



Agricultural University Athens and American Universities

- Joint EU-USA Project 2007-2008 : Policy Oriented Measures in Support of the Evolving Biosystems Engineering Studies in USA – EU
- Joint EU-USA Project 2009-2013 : Trans-Atlantic Biosystems Engineering Curriculum and Mobility
- Training of students of Illinois University at Urbana-Champaign at the Agricultural University of Athens

EU-USA Project 2007-2008 : Policy Oriented Measures in Support of the Evolving Biosystems Engineering Studies in USA – EU - **POMSEBES**

- **European Partners**

- Agricultural University of Athens (Greece); **EU Coordinator:** D. Briassoulis; briassou@aua.gr
- Katholieke University of Leuven (Belgium), The Royal Veterinary and Agricultural University (Denmark), Higher Education Institute in Agricultural Sciences (France), Dresden University of Technology (Germany), University of Bari (Italy), University of Palermo (Italy), Polytechnic University of Madrid (Spain)

- **US Partners**

- Virginia Tech (Virginia); **US Coordinator:** S. Mostaghimi; smostagh@vt.edu
- University of Illinois at Urbana-Champaign (Illinois), Iowa State University (Iowa), Texas A&M University (Texas)

EU-USA Project 2007-2008 : Policy Oriented Measures in Support of the Evolving Biosystems Engineering Studies in USA – EU - **POMSEBES**

- **Goals of POMSEBES**
- The goal of the project is to contribute, by means of specific policy measures, to the structural development of the emerging discipline of Biosystems Engineering, through enhancing collaboration between the European Union and the United States. The specific objectives are to:
 - Provide a platform for a systematic exchange of experiences and ideas between the US and EU to establish appropriate policy oriented measures;
 - Develop policy as well as appropriate curricula for Biosystems Engineering; and
 - Encourage compatible educational programs of studies within the EU as well as between the EU and US.

EU-USA Project 2009-2013: Trans-Atlantic Biosystems Engineering Curriculum and Mobility - TABE.NET

- **Web:** <http://www.ucd.ie/tabe/>
- **European Partners**
 - University College Dublin (UCD); EU Coordinator
 - Agricultural University of Athens (AUA)
 - Universidad Politecnica de Madrid (UPM)
 - University of Bari (UniBar)
- **US Partners**
 - Virginia Polytechnic Institute and State University (VT); US Coordinator
 - University of Illinois at Urbana-Champaign (UIUC)

EU-USA Project 2009-2013: Trans-Atlantic Biosystems Engineering Curriculum and Mobility - TABE.NET

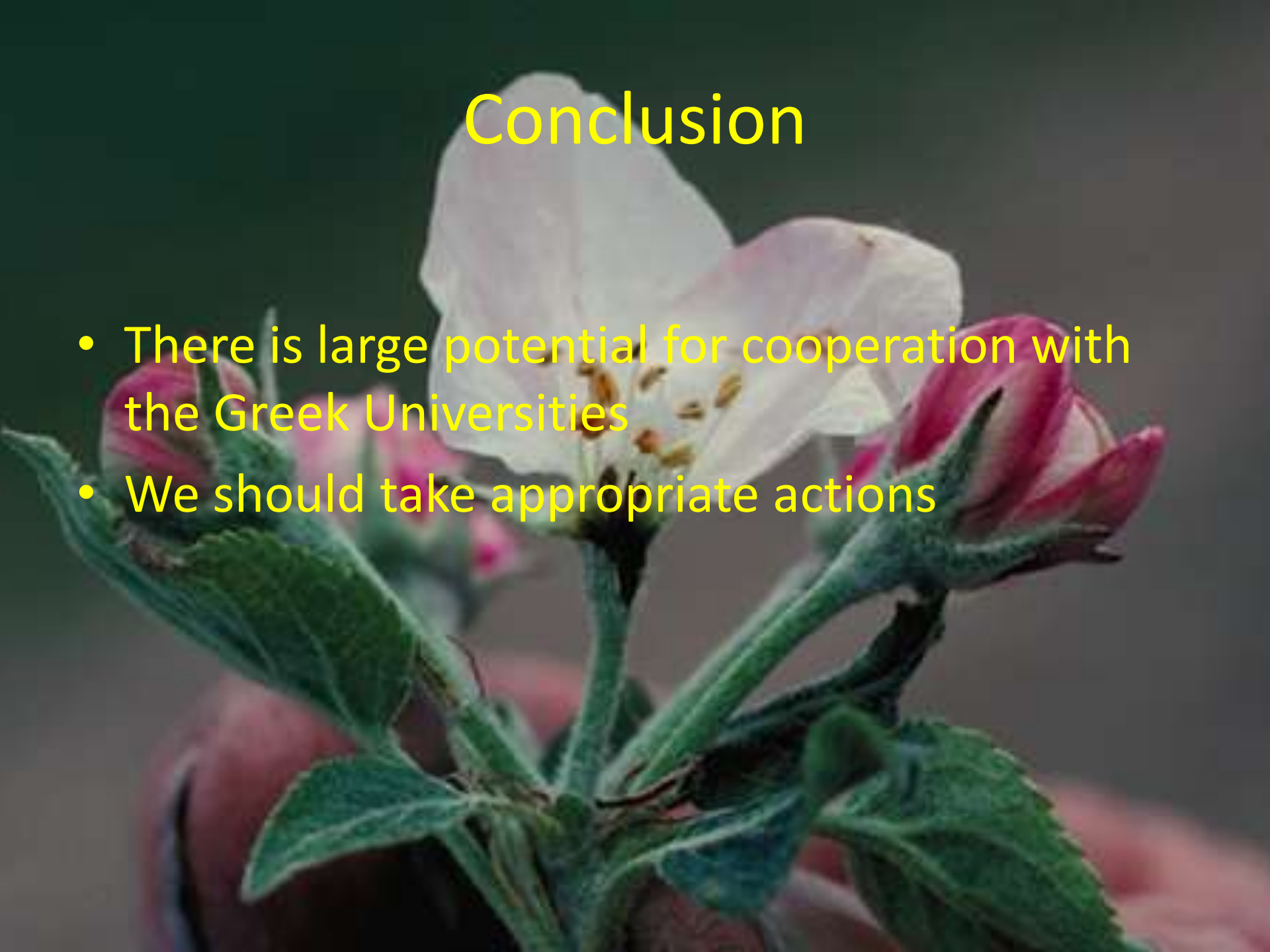
- Goals of TABE.NET
 - To define the common threads within the discipline of Biosystems Engineering (BSEN);
 - To globalize core Biosystems Engineering courses by creating a database of multinational examples that can be drawn upon by instructors around the world;
 - To develop innovative courses to advance the continuing development of Biosystems Engineering programs in the US and EU (and globally);
 - To design student and staff/faculty mobility experiences that enhance the global perspectives of both; and
 - To create a cohort of students aware of, and able to work in, a global employment market.

Agricultural University of Athens and the Illinois University at Urbana-Champaign

- Direct collaboration of the Dept. of Agricultural and biological Engineering of UIUC and Dept. of Natural Resources and Agricultural Engineering of AUA
 - UIUC coordinator: Stephen Zahos, szahos@illinois.edu
 - AUA coordinator: George Papadakis, gpap@aua.gr
- Goals: Visits and training of Illinois students on Renewable energy technologies at AUA
- Collaboration started in 2009
- Next visit in 2011

Conclusion

- There is large potential for cooperation with the Greek Universities
- We should take appropriate actions



Thank you

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