مؤتمر تحلية المياه الثاني عشر في الدول العربية

The 12th Water Desalination Conference in the Arab Countries

King Abdulaziz University
Centre of Excellence in Desalination Technology

Mohammed H. AlBeirutty

Unifying Research Efforts in the Arab Countries: Experience and Approach

Contents

- Experience of the Kingdom of Saudi Arabia in coordinating and unifying research efforts in desalination among various public and private sectors in the country
- Overview of desalination research trends in the Arab countries
- Prospects for coordinating and unifying R&D efforts in desalination between the Arab countries in view of experiences of other regions

Experience of the Kingdom of Saudi Arabia in Coordinating and Unifying Research Efforts in Desalination Among Various Public and Private Sectors in the Country

Initiative of SWCC to unify desalination research efforts

- 1st meeting

Held on 30 /10/ 1430H (19 Oct. 2009) in Jubail and organized by The Saline Water Desalination Research Institute , SWCC under the auspices of His Excellency the Governor.

- 2nd meeting

Held in KAUST on 11 Safar 1431 AH (26 January 2010) organized by the Desalination and Water Reuse Center.

- 3rd meeting

Held in Riyadh on 26 /4/1431 ,(11 April 2010) at the Intercontinental Hotel During the ARWADEX Conference.

- 4th meeting

Held in KAU on 10/2/1432H (21 DEC. 2010) organized by the Centre of Excellence in Desalination Technology(CEDT).

- 5th meeting

?

Experience of the Kingdom of Saudi Arabia in coordinating and unifying research efforts in desalination

Participants

- ✓ Ministry of Water and Electricity
- ✓ Saline Water Desalination Research Institute (SWCC-DTRI)
- ✓ Saudi Aramco
- ✓ King Abdul Aziz City for Science and Technology(KACST)
- ✓ King AbdulAziz University (KAU-CEDT).
- ✓ King Saud University (KSU).
- ✓ King Abdullah University of Science and Technology (KAUST).
- ✓ King Fahad University of Petroleum and Minerals (KFUPM).
- ✓ AlFaisal University
- ✓ Bushnak Group
- ✓ Dammam University
- ✓ Others

Objectives of SWCC initiative

- To Unify research efforts among various public and private sector entities
- To enable the localization of desalination technology in the Kingdom
- To produce desalinated water using innovative and cost effective methods

1st meeting outcomes @SWCC

- ✓ There is a need to Form an advisory body for water technology.
- ✓ There is a need to develop a technical road map for Desalination Research and also for the distribution of roles among the different research centers and groups
- ✓ Establish a mechanism for commercialization of research results through the formation of a quasi-governmental body for marketing research outputs.
- ✓ There is a need for the participation of the private sector in supporting and implementing research in the field of water desalination
- ✓ Learn from the experience of other countries (e.g. Singapore) in applying the results of research through collaboration with international agencies.
- ✓ Every participating entity is encouraged to present a summary of the research work carried out and the available facilities for the benefit of exchanging expertise and facilities with others.

Experience of the Kingdom of Saudi Arabia in coordinating and unifying research efforts in desalination

2nd meeting outcomes @KAUST

FORMED FOUR RESEARCH GROUPS:

1. **Thermal Desalination Group**

   "DEVELOPMENT OF COST EFFECTIVE HYBRID MSF/MED/RO DESALINATION PLANTS".

2. **Membrane-Based Desalination Group**

   "DEVELOPMENT OF NEW INORGANIC-ORGANIC COMPOSITE RO MEMBRANES WITH IMPROVED PERMEABILITY AND ACCEPTABLE SALT REJECTION"

3. **Environemental Sustainability Group**

   DEVELOPMENT OF SUSTAINABLE TECHNIQUES TO CONTROL MEMBRANE BIOFOULING IN DESALINATION PLANTS

4. **Innovation & Infrastructure Group**

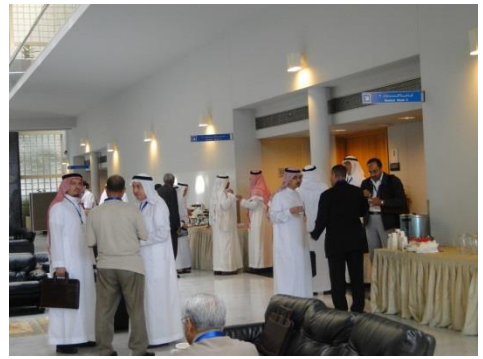
   BUILD THE SOFT INFRASTRUCTURE NEEDED TO SUPPORT SAUDI DESALINATION R&D EFFORTS. ARAB PORTAL THAT CAN SERVE BOTH AS COMMUNICATION AND INNOVATION NETWORK, ARAB DESALINATION NETWORK, ADN.

Experience of the Kingdom of Saudi Arabia in coordinating and unifying research efforts in desalination

4th meeting outcomes

- **Finalize previously proposed research projects by each group.**
- **Identify the source of funding for the proposed projects.**
- **Generate new ideas for research projects.**
- **Initiate work towards the technical roadmap for desalination research.**

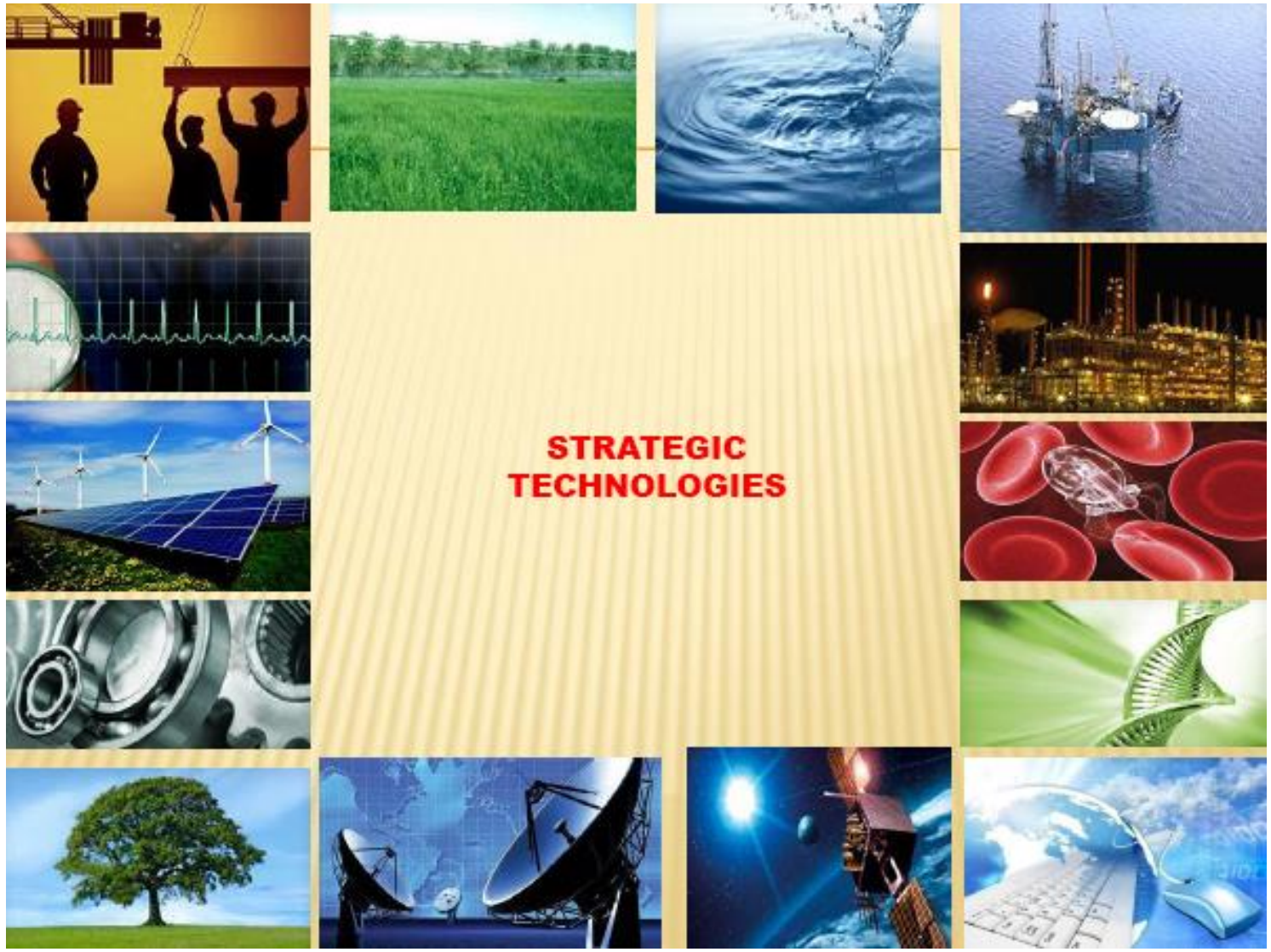





Experience of the Kingdom of Saudi Arabia in coordinating and unifying research efforts in desalination

مدينة الملك عبدالعزيز للعلوم والتقنية
KACST

Role of King Abdulaziz City of Science and Technology in R&D coordination



Role of King Abdulaziz City of Science and Technology in R&D coordination

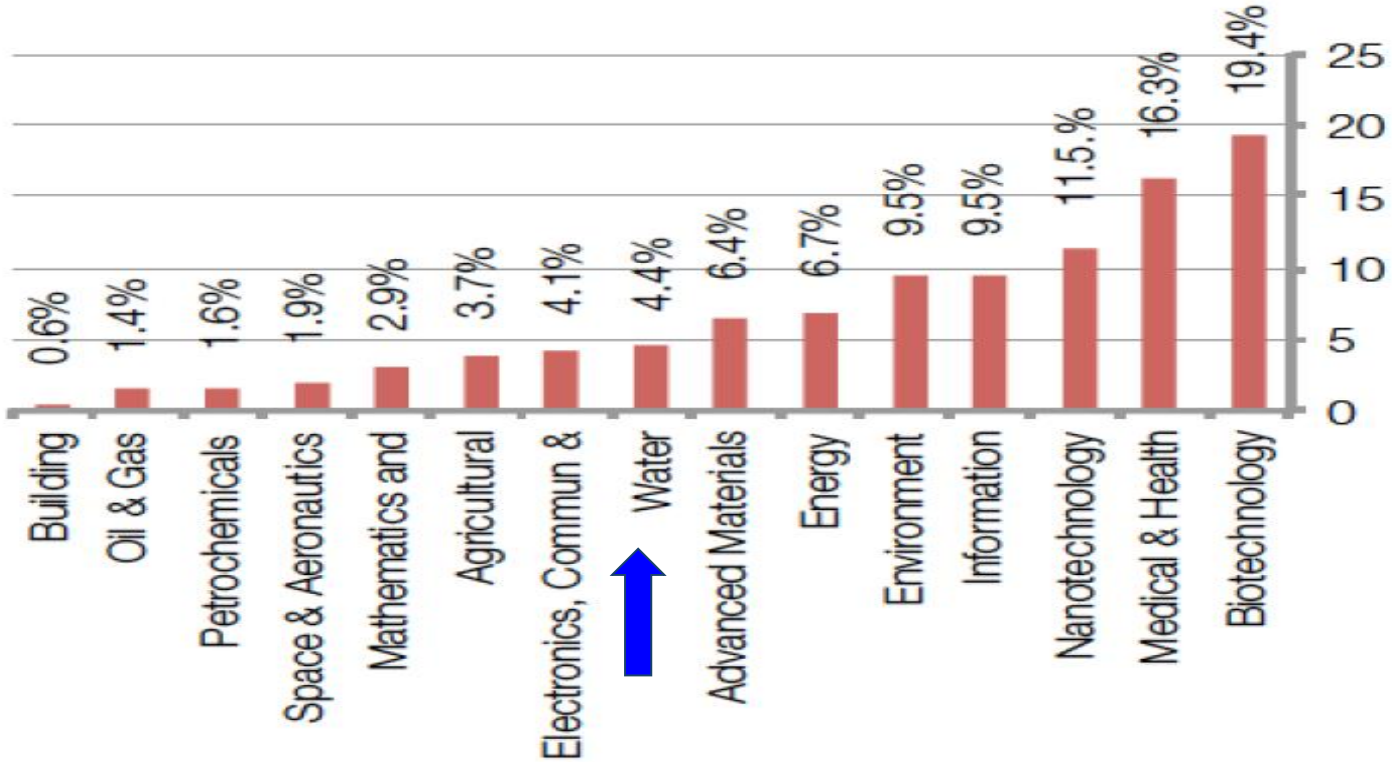
National Science, Technology & Innovation Plan (NSTIP)

- NSTIP was approved by the Council of Ministers in 1423 H (2002 G)
- 14 programs for localization and development of strategic technologies to boost innovation.

NSTIP Programs

- **The Capacity Building Program for Scientific Research and Technology Development**
  Aims: to establish research centers focusing on high priority fields of development such as oil and gas, water, environment, agriculture and medical and health.
- **The Technology Transfer and Localization Program**
  Aims: to support innovation and technology development and identifies hubs for the development of advanced industrial technologies.

Role of King Abdulaziz City of Science and Technology in R&D coordination



The percentage of funded projects in various technology areas

Source: (NSTIP Annual Report: 2012)

مدينة الملك عبدالعزيز للعلوم والتقنية KACST

Role of Ministry of Education in R&D coordination

The Research and Development Office (RDO) of the Ministry of Education was established in 2017 to transform the R&D ecosystem through strategic initiatives to enhance the research capacity in the Kingdom of Saudi Arabia.

وزارة التعليم
Ministry of Education

RDO Current Initiatives (quick win)

رؤية VISION 2030
المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA

- **Post-Doctoral Fellowships program**
- **International Collaboration Initiatives**
  - **Research Capability Grant – SAR 0.6 to 1.8 million**
  - **Grand Challenges Grant – up to SAR 7.5 million**
- **University-Industry Collaboration Initiative**
- **Research Capital Fund**
- **PhD scholarship Facilitation**
- **Centers of Excellence**

Role of Ministry of Education in R&D coordination

Post-Doctoral Fellowships program

- The Post-Doctoral Fellowships program consists of grants given to universities to support young Post-Doctoral Fellows to conduct key research, in line with national strategic priorities.

- These Fellowships aim to strengthen the research capabilities within our Universities, as well as develop and advance the skills and career prospects of the Fellows.

Role of Ministry of Education in R&D coordination

Two types of grant to be made available. Funds delivered over *three years* on an annual installment basis:

1. **Research Capability Grant – SAR 0.6 to 1.8 million**

The objective is to support basic and applied research contributing to the following fields:

- ***Desalination & Water Reuse***
- **Renewable Energy**
- **Biogenomics, Nanobiology, Catalysis & Polymers, Oil & Gas, Pollution Management**
- **Red Sea & Marine Studies**
- **Crowd Management, Climate Change, Machine Learning, Cyber Security**

2. **Grand Challenges Grant – up to SAR 7.5 million**

The objective is to support work directly relevant to accomplishment of one of the following Grand Challenges that were agreed at the RDO's International Collaboration Conference in April 2018:

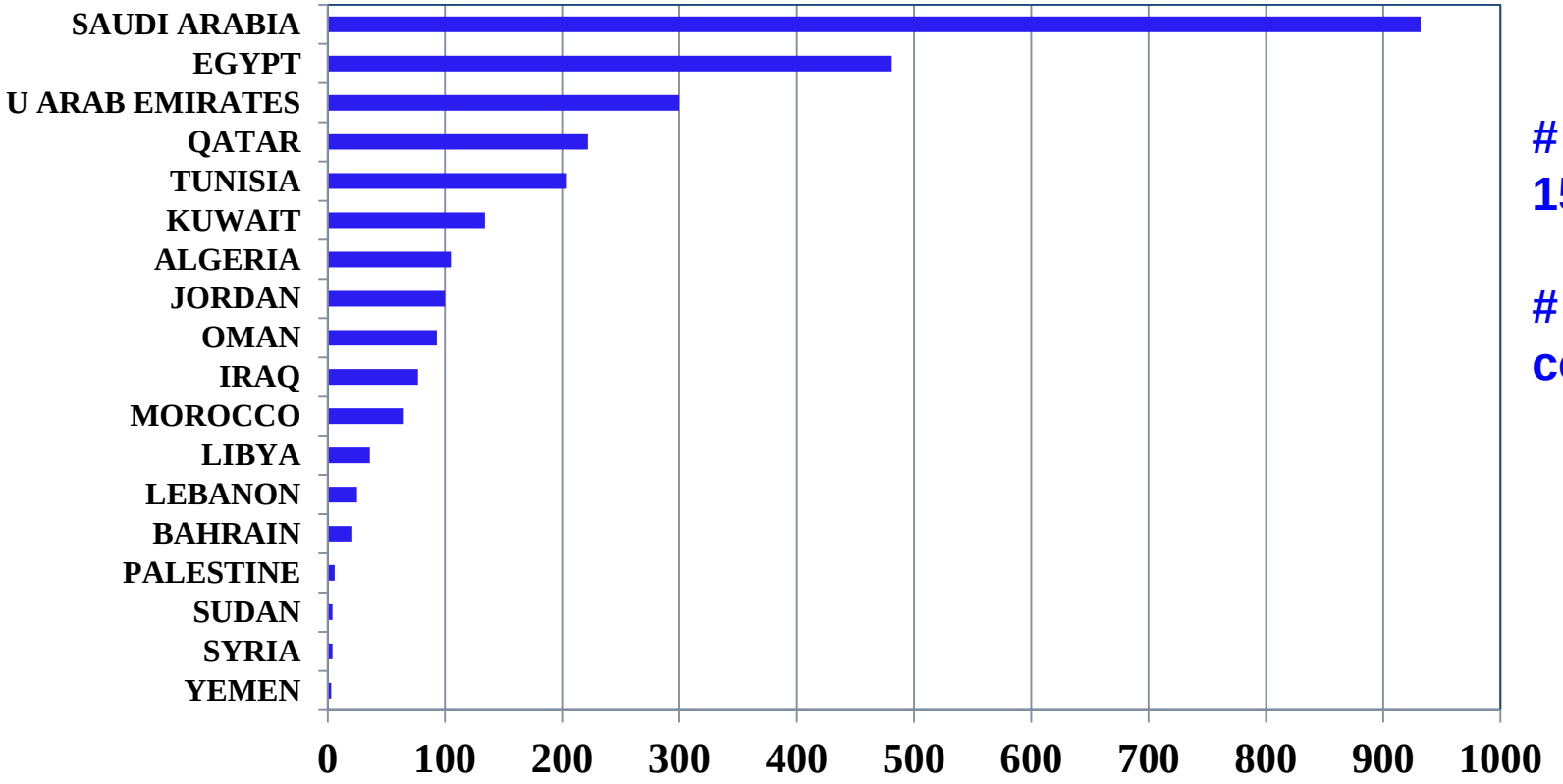
- ***Increase the total available capacity of desalinated water by 50%***
- **Increase the reliable transmission and storage of renewable energy to account for 4% of total energy use**
- **Reduce the threat posed by emerging infectious diseases through prediction, pandemic detection, and vaccine development**
- **Develop a real-time simulation and monitoring mechanism for Massive Crowd Movement with early warning capabilities**

Overview of Desalination Research Trends in the Arab Countries

Overview of desalination research trends in the Arab countries

Distribution of ISI-indexed articles on desalination in the Arab countries

Web of Science: Date of access 08 April 2019



# of articles world wide : 15,044

# of article for the Arab countries: 2811

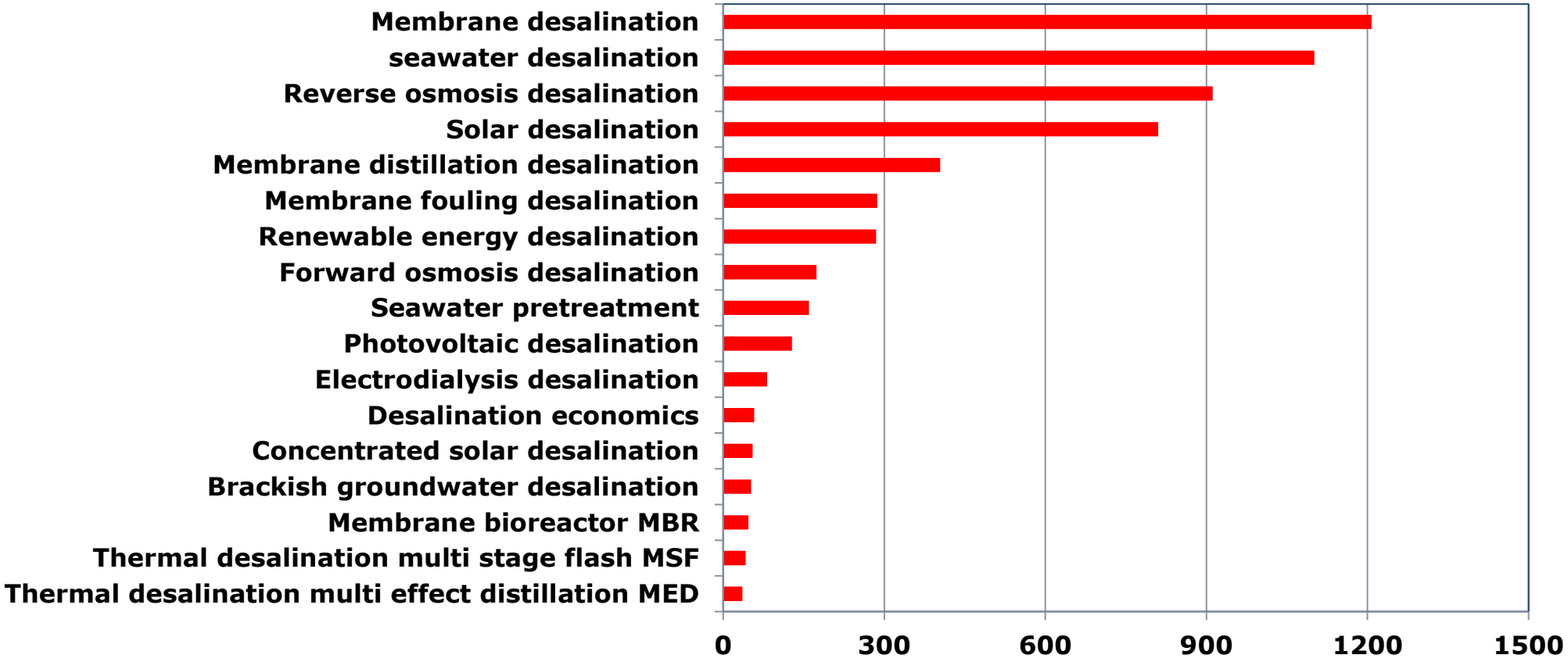
# of articles published after year 2008

TOPIC: (desalination)

Overview of desalination research trends in the Arab countries

Focus areas of desalination research in Arab countries

Web of Science: Date of access 08 April 2019

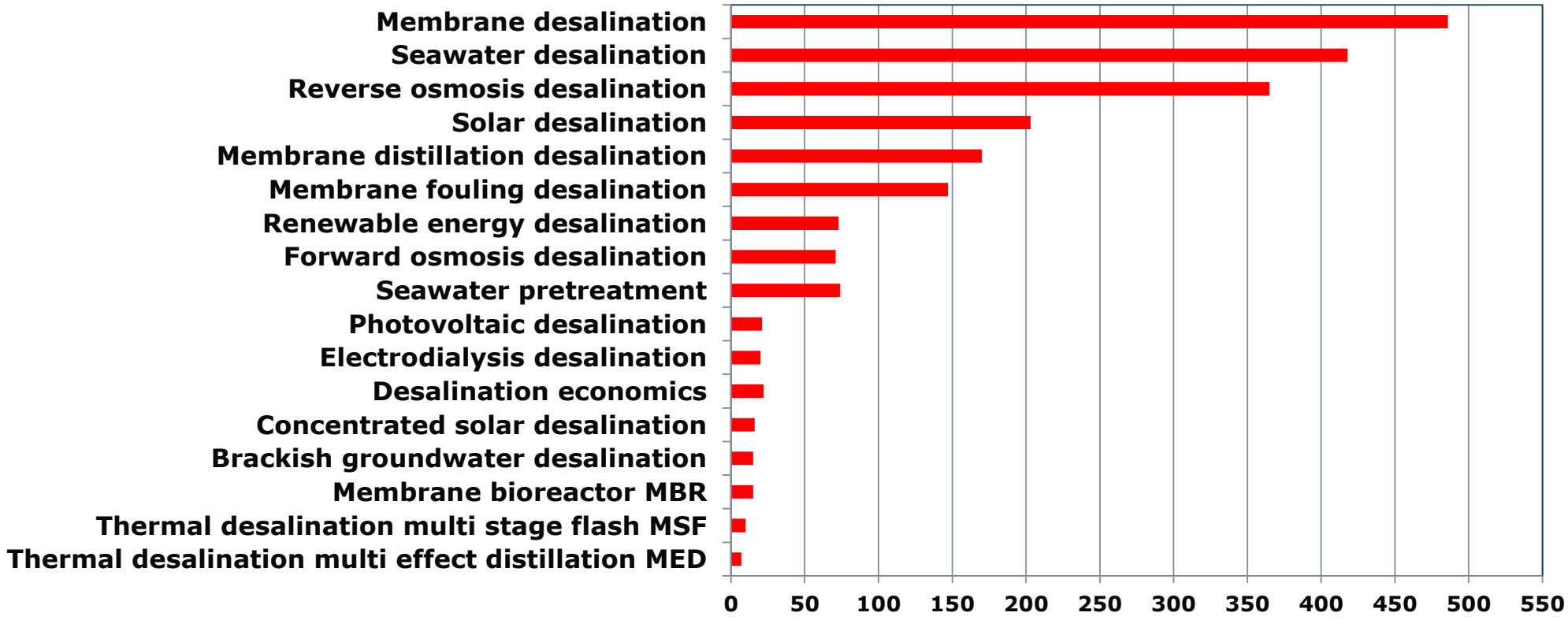


# of articles published in Arab countries after year 2008 as per most frequent author keywords used

Overview of desalination research trends in the Arab countries

Focus areas of desalination research: Saudi Arabia

Web of Science: Date of access 08 April 2019

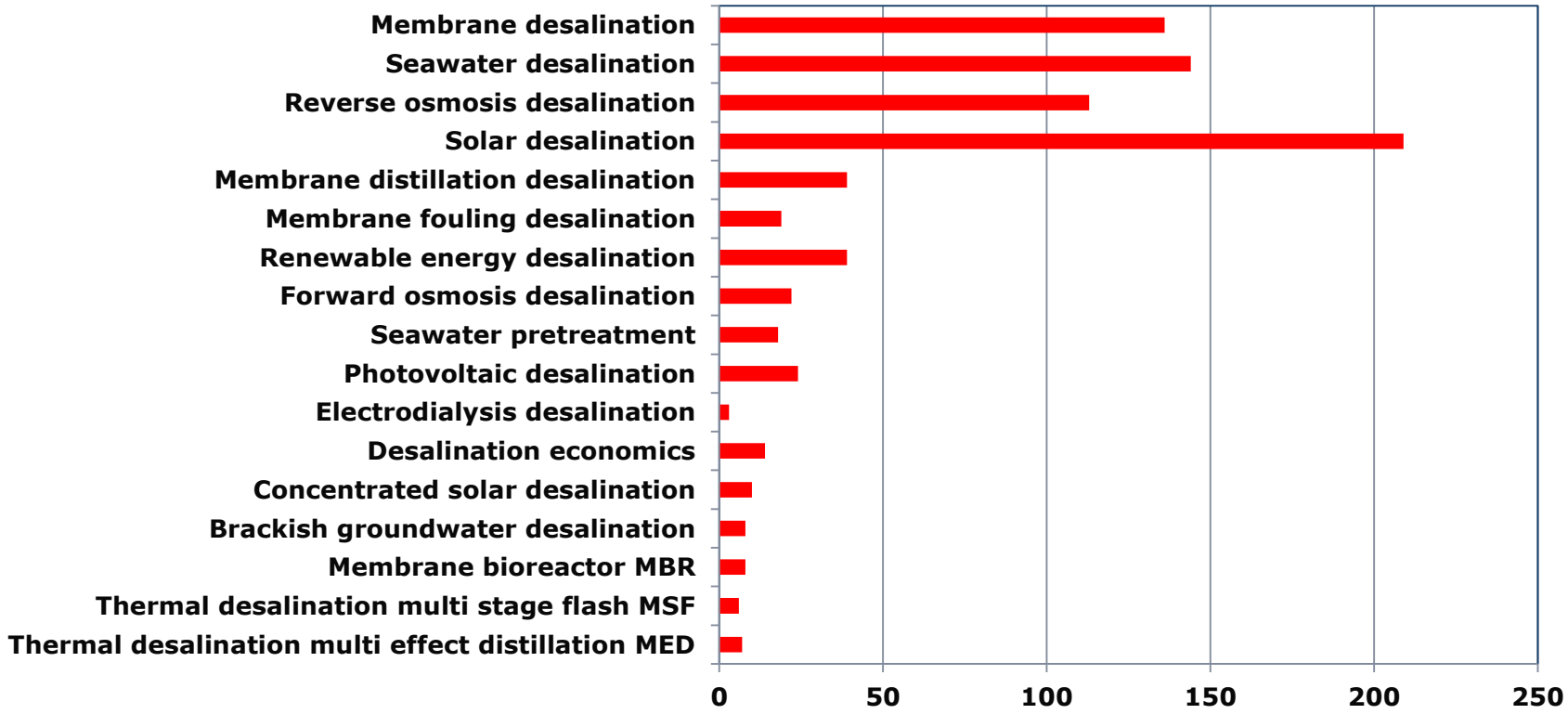


# of articles published after year 2008 as per most frequent author keywords used
Country: Saudi Arabia

Overview of desalination research trends in the Arab countries

Focus areas of desalination research: Egypt

Web of Science: Date of access 08 April 2019



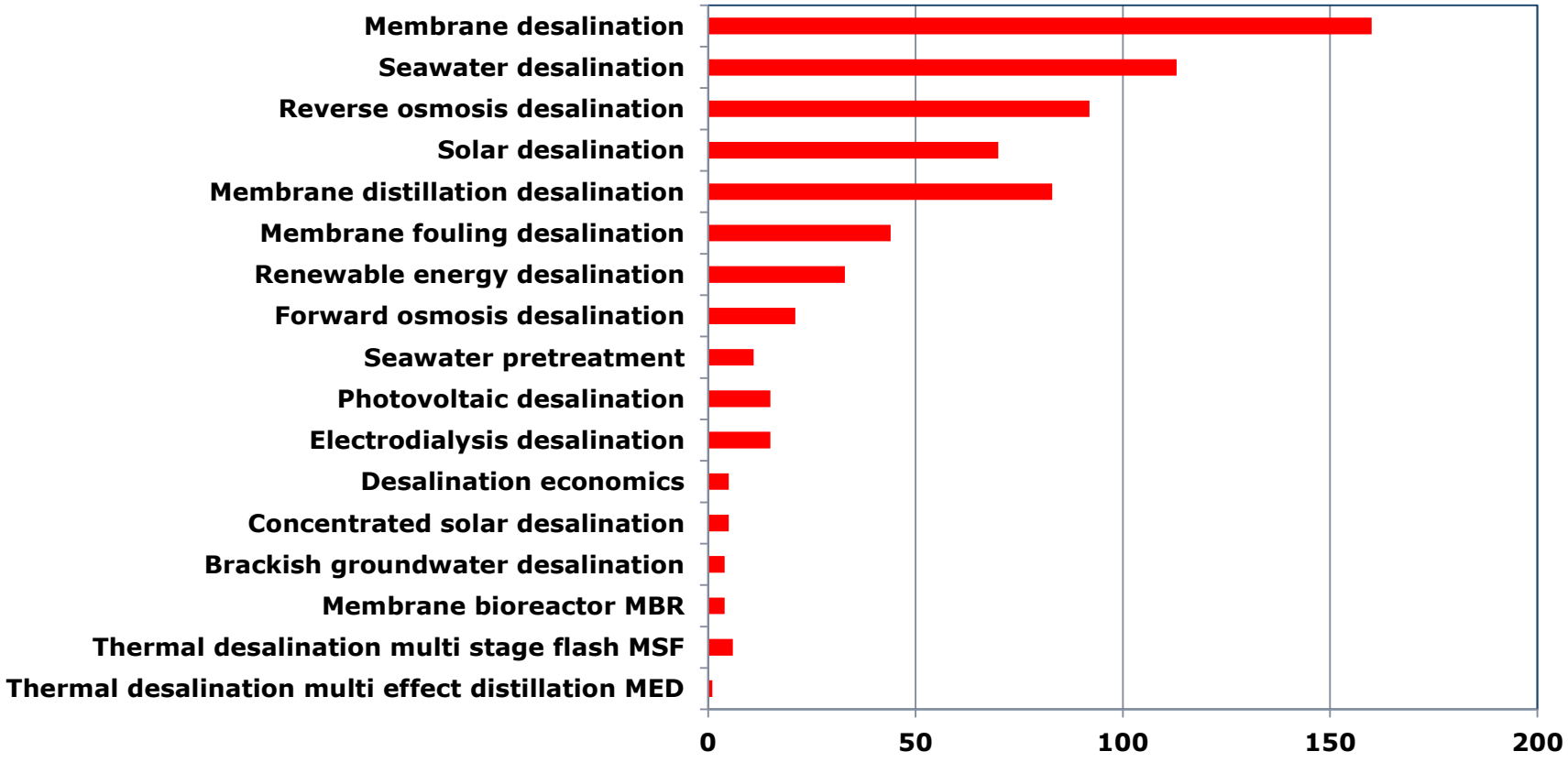
# of articles published after year 2008 as per most frequent author keywords used

Country: Egypt

Overview of desalination research trends in the Arab countries

Focus areas of desalination research: United Arab Emirates

Web of Science: Date of access 08 April 2019



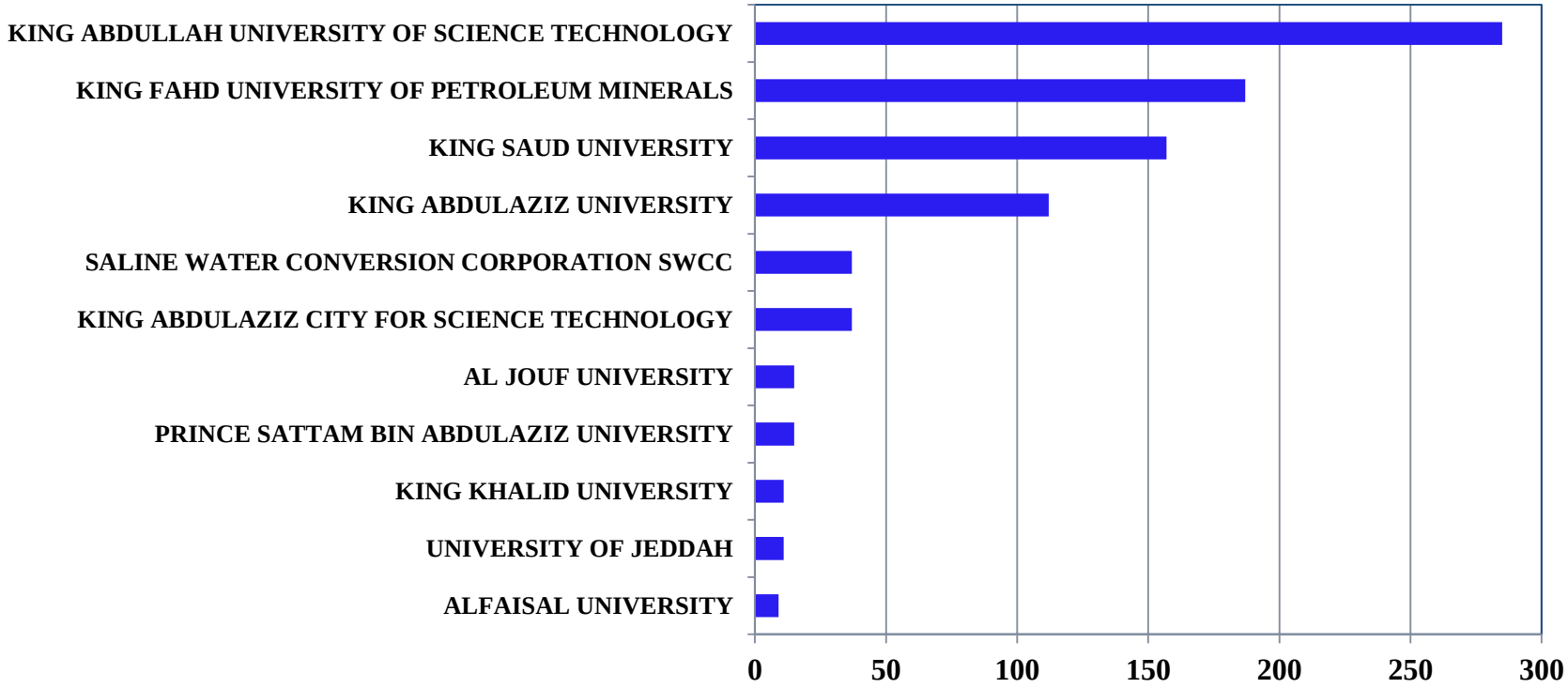
# of articles published after year 2008 as per most frequent author keywords used

Country: United Arab Emirates

Overview of desalination research trends in the Arab countries

Leading research institutions in desalination fields as measured by the number of ISI-indexed articles on desalination : Saudi Arabia

Web of Science: Date of access 08 April 2019



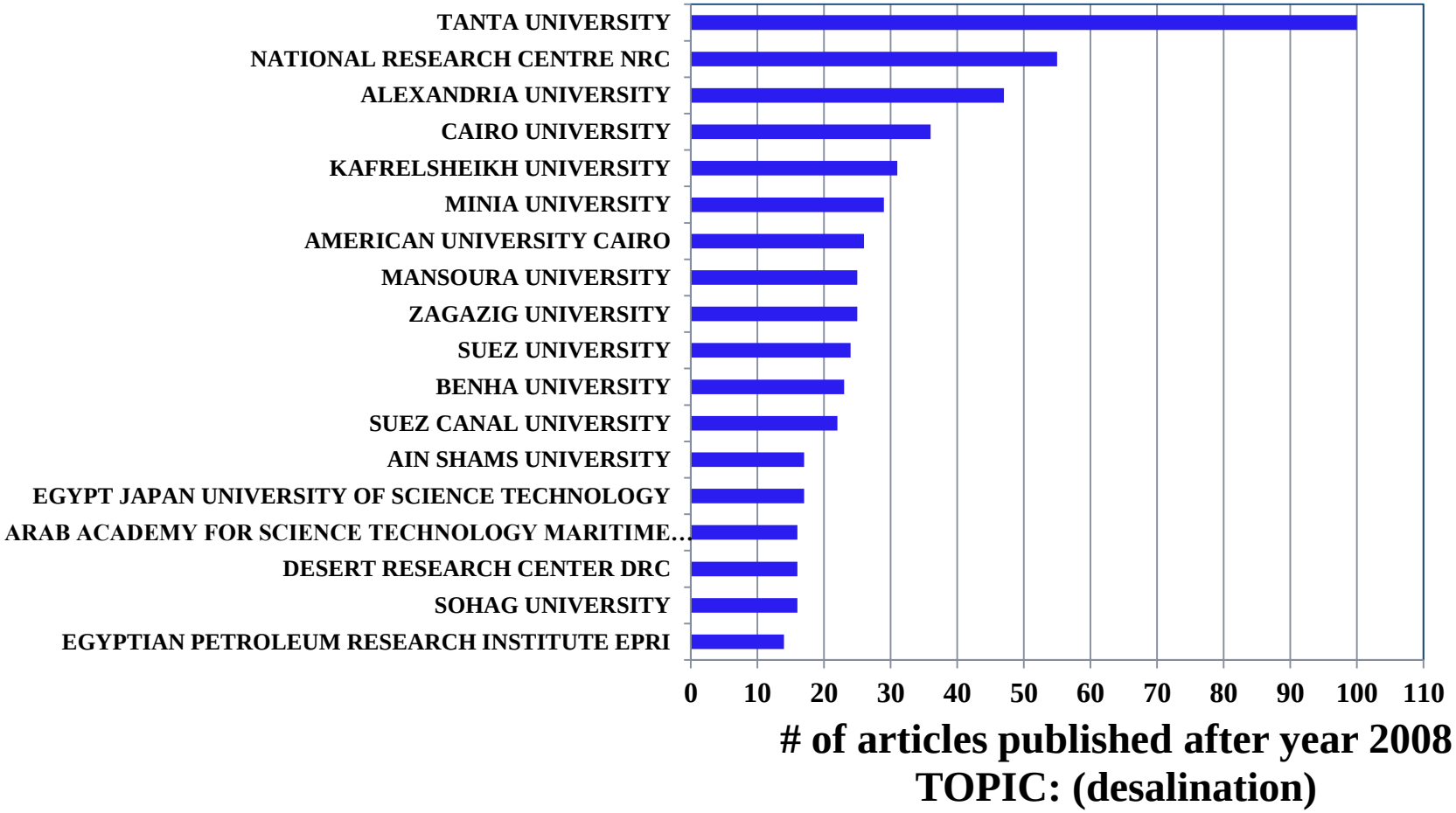
# of articles for Saudi Arabia : 930 (TOPIC : Desalination)

# of articles published after year 2008
TOPIC: (desalination)

Overview of desalination research trends in the Arab countries

Leading research institutions in desalination fields as measured by the number of ISI-indexed articles on desalination : Egypt

Web of Science: Date of access 08 April 2019

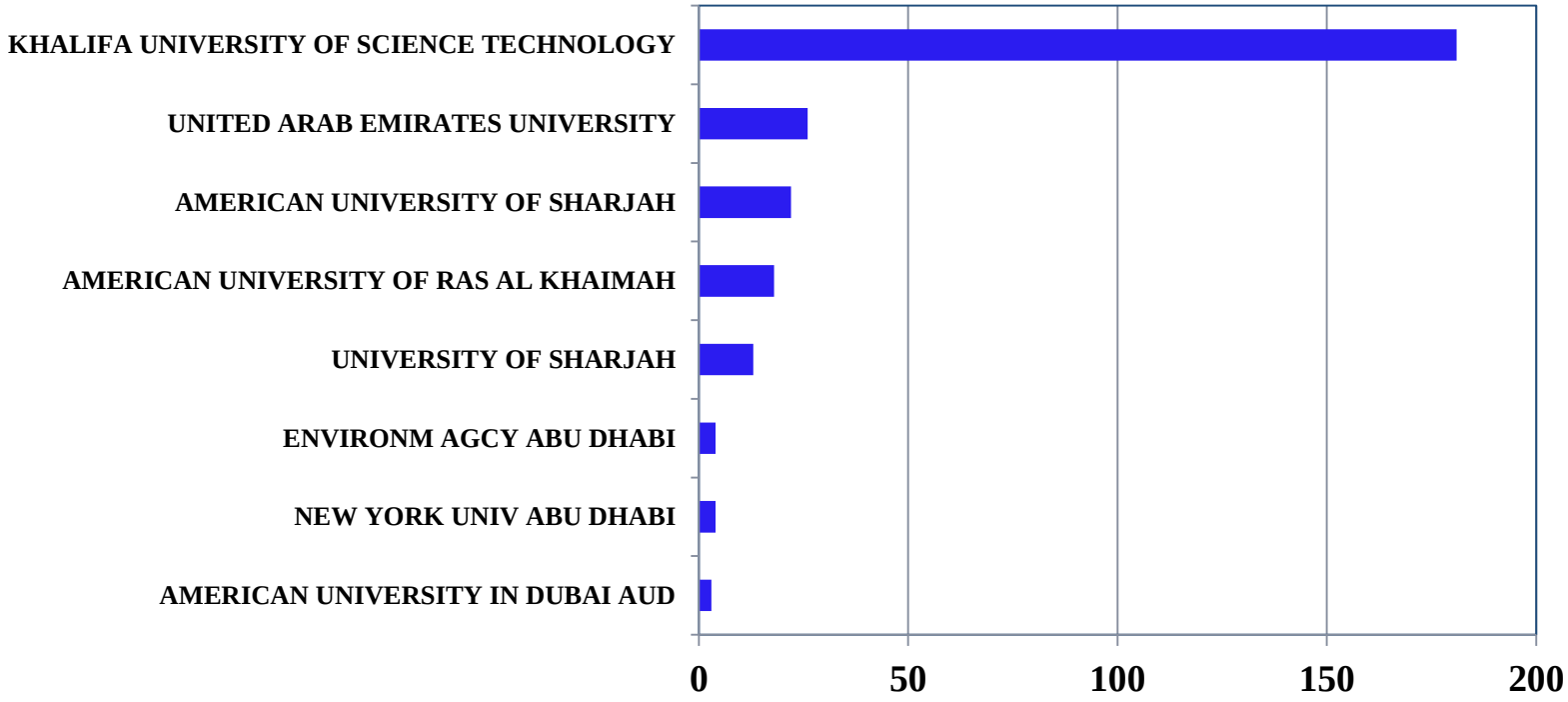


# of articles for Egypt : 481 (TOPIC : Desalination)

Overview of desalination research trends in the Arab countries

Leading research institutions in desalination fields as measured by the number of ISI-indexed articles on desalination : United Arab Emirates

Web of Science: Date of access 08 April 2019



# of articles for United Arab Emirates : 300

(TOPIC : Desalination)

# of articles published after year 2008
TOPIC: (desalination)

Prospects for Coordinating and Unifying R&D Efforts in Desalination Between the Arab Countries

Needed elements for a framework for desalination research collaboration

- Identify mutual research priorities in the Arab countries and among research teams
- Attract participation of leading research institutes in the Arab countries
- Involve graduate students as in collaboration through student exchange programs
- Initiate collaboration: researcher level agreements, university level agreements, governments level agreements
- Attract funding by different financing bodies

Research financing bodies:

- **Concerned organizations of the Arab League:**

  مثال: المنظمة العربية للتربية والثقافة والعلوم (الألكسو)

- **Private sector and charity organizations:**

  مثال: المؤسسة العربية للعلوم والتكنولوجيا (مقرها الشارقة-الإمارات العربية المتحدة)

- **International organizations:**

  Example: World Bank, UNICEF,

How to realize a framework for desalination research collaboration?

- **Enable and activate one of the existing bodies:**

For example:

The Arab Water Council

- **Establish a new non-governmental body:**

For example:

Arwadex commission

Arab Desalination Scientists Forum

Arab Desalination Network

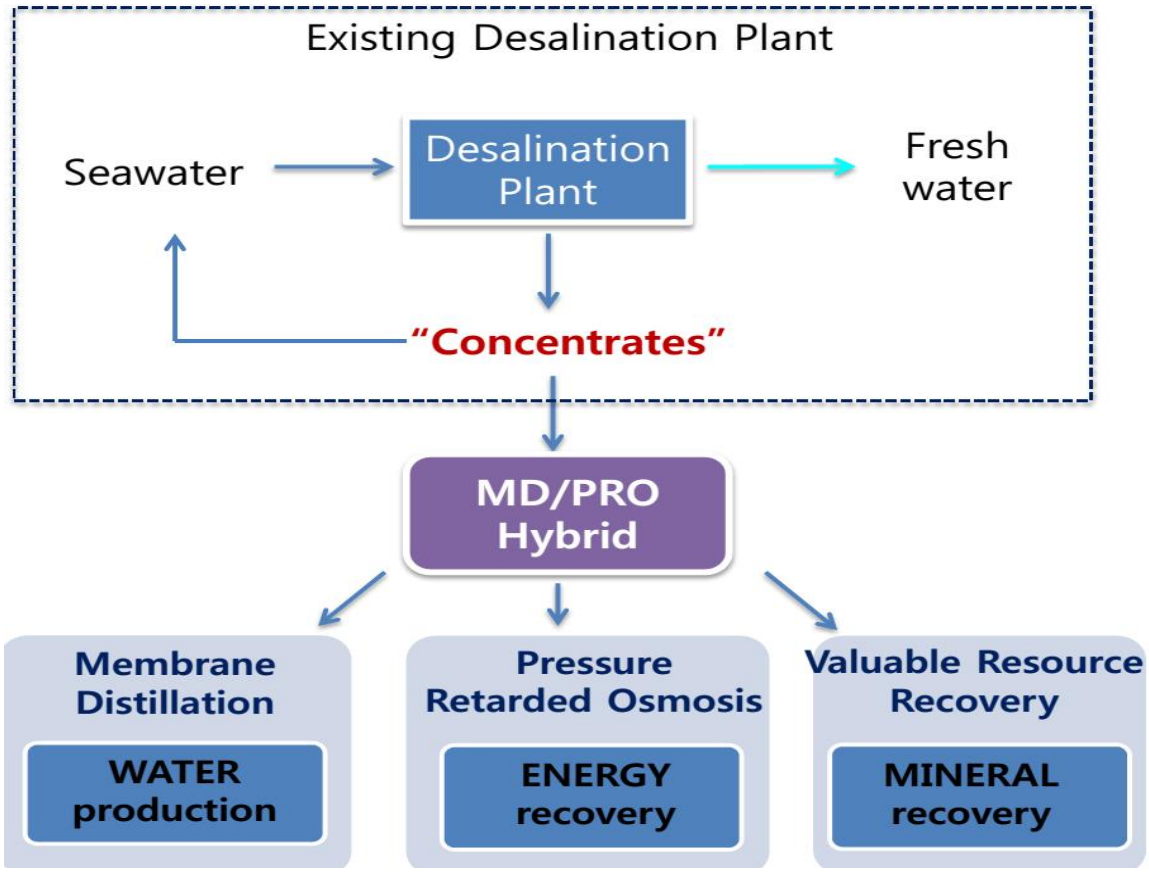
Horizon 2020

- **Horizon 2020 is the biggest EU Research & Innovation programme ever**
  - **Nearly €80 billion of funding available over 7 years (2014 to 2020),**
  - **in addition to the private investment that this money attracts.**

- **By coupling research and innovation, Horizon 2020 helps achieve smart, sustainable and inclusive growth**

- **Horizon 2020 is open to participation and has a bottom-up approach**
  - **Multi-actors: companies, universities, public authorities, NGOs, etc.**
  - **Multi-disciplinary to tackle all societal challenges**
  - **Horizon 2020 is open to participation of researchers and innovators from anywhere in the world**

Prospects for coordinating and unifying R&D efforts in desalination between the Arab countries



- **Project: GMVP, Korea**
- **Goal: to develop third generation desalination technology**
- **Period: 2013-2018**
- **Budget: USD 35 M**

- **Partners**
  - **Academia : KNU, SNU, KMU, HYU, KST, PKNU, GIST, UTS**
  - **Research Institutes : KICT, KIST, KIER, RIST**
  - **Industry : GS E&C, Econity, TCK, Anytech.**

Source: DesalTech 2015 proceedings

Thank You

THANK YOU

Center of Excellence in Desalination Technology

مـركـز التميـز البحثـي في تقنية تحلية المياه

الريادة في تقنية تحلية المياه
Pioneering in Desalination Technology

معمل توصيف واختبار الأغشية
Membrane characterization labs

معامل عمليات التحلية
Desalination processes labs

معمل تصنيع الأغشية
Membrane synthesis lab

معمل تحليل المياه
Water analysis lab

العمليات الحرارية لتحلية المياه
Thermal desalination

معالجة مياه التغذية واتساخ الأغشية
Feed water pretreatment and membrane fouling

تحلية المياه بتقنية الأغشية
Membrane desalination

تحلية المياه بالطاقة الشمسية
Solar-Driven Desalination

إدارة مياه الرجيع
Brine management