جامعة الملك عبدالله
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King Abdullah University of
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KAUST, the SDGs and the cleantech investment opportunities and challenges in Saudi Arabia and the region

Multi-stakeholder Forum on Science, Technology and Innovation for the SDGs
United Nations ECOSOC – June 6, 2016

KAUST is pursuing goal-oriented research addressing four generational themes…

Water

Energy

Food

Environment

Advanced Membranes and Porous Materials

Catalysis

Clean Combustion

Desert Agriculture

Red Sea

Solar and Photovoltaics Engineering

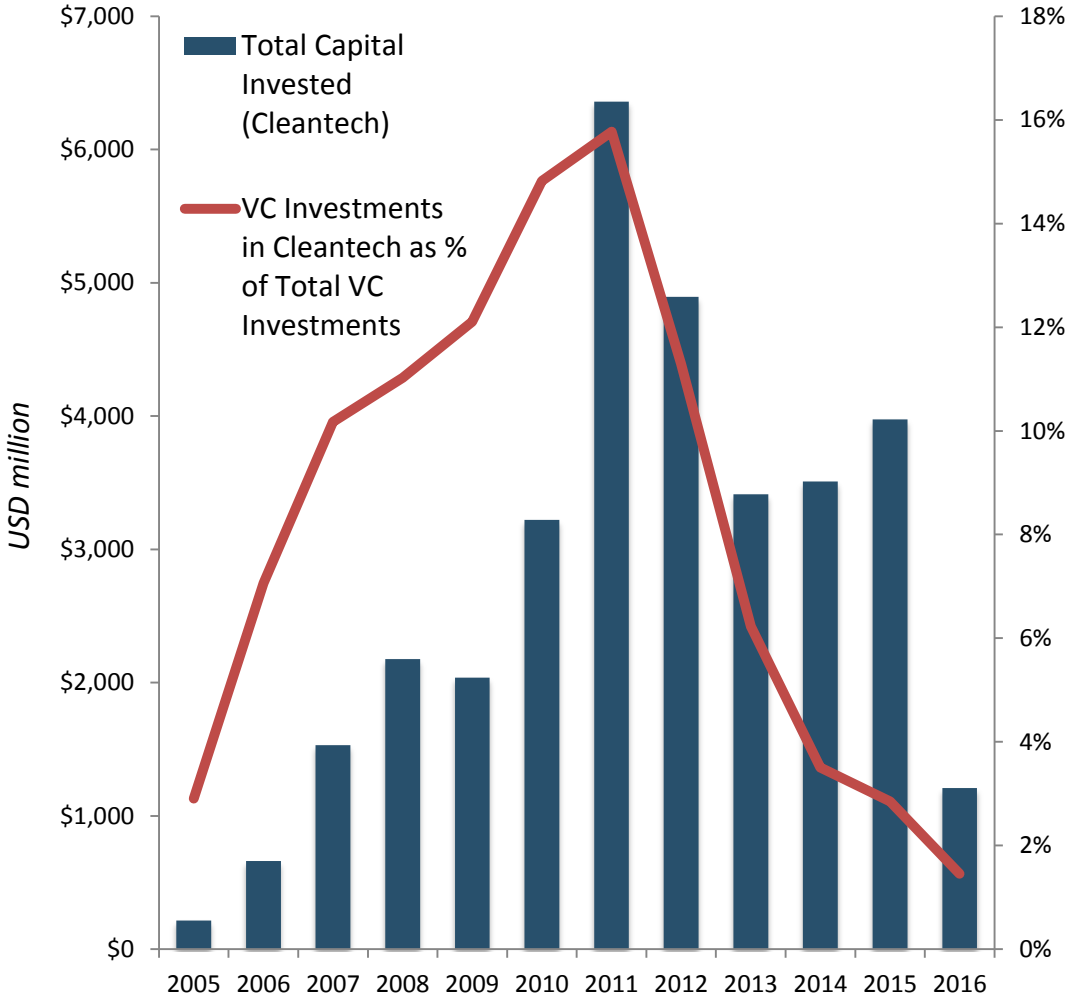
Water Desalination and Reuse

Upstream Petroleum Engineering

Note: the three other KAUST's research centers are contributing indirectly to the four strategic research thrusts.

… that have a direct impact on few of the key Sustainable Development Goals

After the recent VC frenzy (from 2006 to 2011), cleantech is today a sector neglected by investors



Source: Pitchbook

- Total volume of investments is stagnant (50% of 2011 peak).
- Cleantech investments represent today just around 3% of total VC investments (down from 16% in 2011).
- Only few cleantech companies are going public and are acquisition targets.
- A large number of bankruptcies, especially in solar, and the capital intensive nature of the sector have kept investors away.

Solar in the GCC region looks like a no-brainer: perfect environmental conditions, increasing domestic demand, competitive cost

Saudi Arabia could conceivably become one of the heaviest users of solar energy in the world.

- Solar irradiation is double than in Europe (2,400 kWh/m2/year).
- Solar plants are not competing with agriculture, industry or urbanization (2.3 million sq. km of desert and only 0.1% of its surface is needed to cover 100% of future demand).
- In the KSA, peak power demand is estimated to triple in the next 20 years, from 40 GW to 120 GW. If the trend continues without a replacement of fossil fuel in power generation, the Kingdom will become net importer of oil.
- "Saudi Vision 2030" plan has set an initial deployment target of 9.5 GW of solar and other renewable energy sources by 2023. Qatar has set a similar 20% target of renewables share by 2030.
- K.A.CARE had previously set a 41 GW installed solar capacity target for 2032.
- The cost per kWh of solar plants in the region is beating world records

- **KAUST Innovation Fund is investing in alternatives to c-Si solar cells, PV panels dust mitigation, solar thermal desalination.**

The Saudi and regional water desalination industry needs cheaper desal technologies

Saudi Arabia is the world's largest producer of desalinated water, which production is absorbing a huge amount of fossil fuels.

- 3rd highest per capita water consumption, behind the US and Canada.
- ME alone accounts for about 38% of global desalination capacity, with the KSA being the world's largest producer of desalinated water.
- Saudi population that has quadrupled in the last 40 years and internal water demand is growing at an accelerated rate.
- The KSA is burning more than 25% of crude oil production for domestic energy needs (2.8 million barrels/day), which includes 1.5 million barrels/day to power desalination plants.
- The use of crude at a subsidized price of US$4/barrel for power production, generates losses of around US$46/barrel, i.e. an opportunity cost of US$25b/year.

- **KAUST Innovation Fund is investing in new membrane technology, membrane fouling monitoring and prevention, low cost alternative to thermal desal.**

Sustainable technologies are no more about decency or philanthropy, they are now behind successful and profitable businesses

M-Kopa in Kenya.

- A power system at $200: a solar panel, two LED bulbs, an LED flashlight, a rechargeable radio, and adaptors for charging a phone.
- The client pays $35 upfront and the rest through a loan (daily payment of 45¢ for a year).
- An average off-grid household in Kenya spends about 75¢ a day to buy kerosene to fuel lamps.
- Connected more than 330,000 homes and 500 new systems sold/day.

Sheikh Maktoum Solar Park Phase III in the UAE.

- The largest solar park in the world demonstrating that large-scale solar power can now regularly beat fossil-fuel power plants on cost.
- In May 2016, a new world record for the cost of solar power was set with DEWA receiving bids for the 800 MW solar park as low as US2.99 cents/kWh.

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