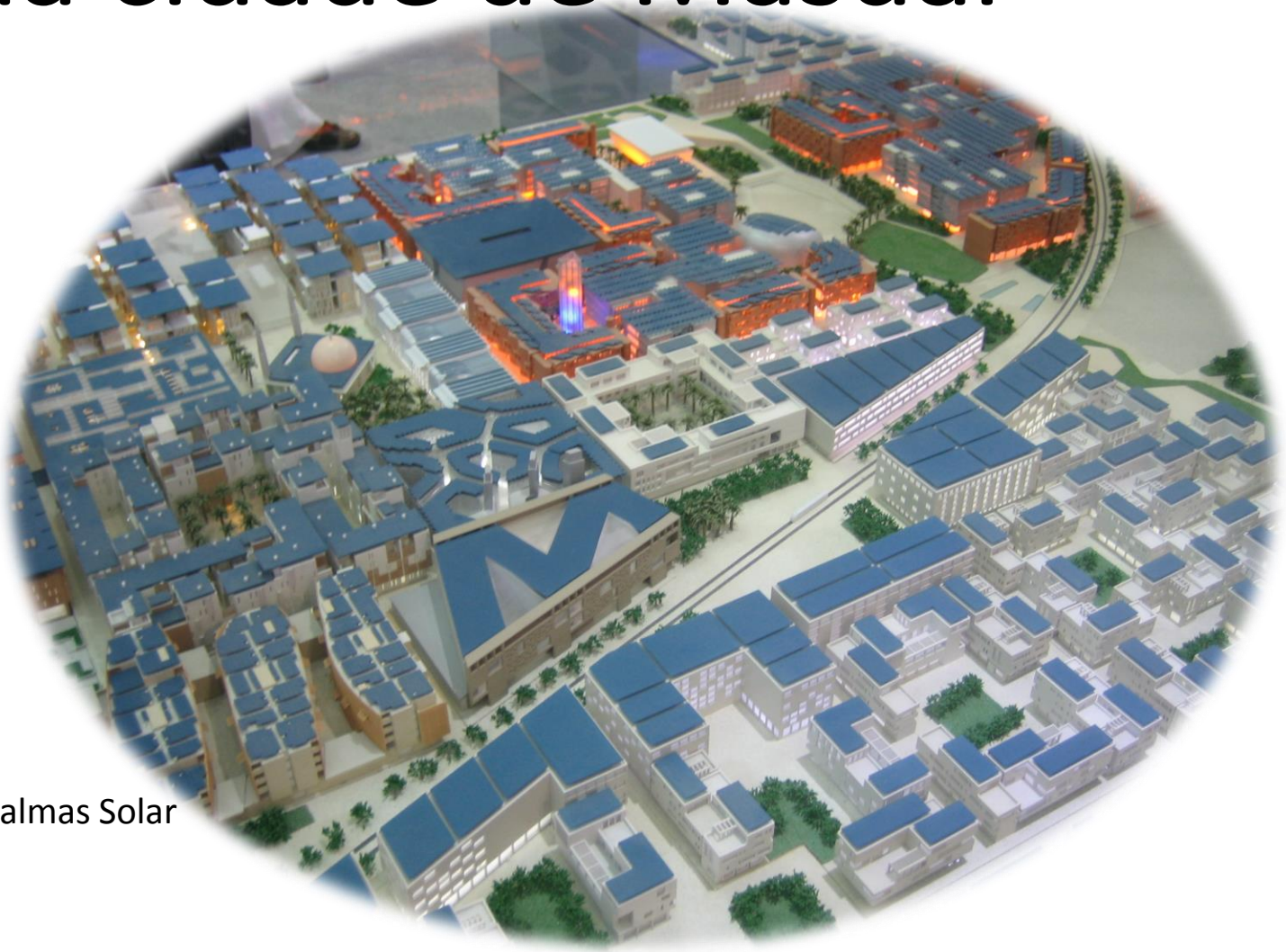
Cidades Sustentaveis

O caso da cidade de Masdar



Jacinto Estima

I Seminário Internacional Palmas Solar

Palmas, Tocantins, Brasil

29 de Junho de 2015


Welcome to Masdar City

A iniciativa de Masdar

- Orientada pela Visão Económica de Abu Dhabi 2030
- Missão para avançar da indústria de energia limpa em Abu Dhabi e no mundo
- Catalisador para a diversificação económica do emirado
- Abordagem holística com cinco unidades de negócios interligados e um braço de pesquisa que complementa o seu trabalho:
  - Masdar Capital
  - Masdar Clean Energy
  - Masdar Special Projects
  - Masdar City
  - the Free Zone
  - Masdar Institute (research arm)

A Cidade de Masdar

Fatores chave de sustentabilidade

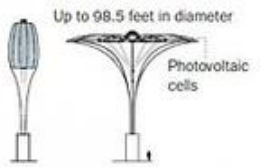
- Planta solar fotovoltaica de 10MW
- Array de painéis solares sobre os edificios de 1MW
- Ruas maximizam a sombra durante todo o dia, capturando brisas refrescantes e reduzindo a necessidade de ar condicionado
- Conservação da água:
  - aparelhos de alta eficiência
  - chuveiros de baixo fluxo
  - medidores de água inteligentes
  - águas residuais tratadas, recicladas para irrigação de plantas
- Monitoramento em tempo real
- Irrigação de alta eficiência e paisagismo de baixa necessidade de água

A Sustainable City in the Desert

Promoters of Masdar, a city under construction near Abu Dhabi, say that it will be the world's first carbon-neutral city. It will be home to a research institute focused on renewable energy and sustainability, and eventually, if all goes as planned, to various clean-technology companies, and to a projected 45,000 residents and another 45,000 commuters.

Complete this fall Under construction

Neighborhoods will have distinct buildings and design elements. Masdar Plaza, for example, will have 54 sunshades that open and close automatically at dawn and dusk.



Streets are laid out at angles that optimize shading. Long, narrow parks catch and cool the prevailing winds, and assist in ventilating the city.

Phase 1 MASDAR INSTITUTE
The area being completed this fall has some design features common to the entire project.

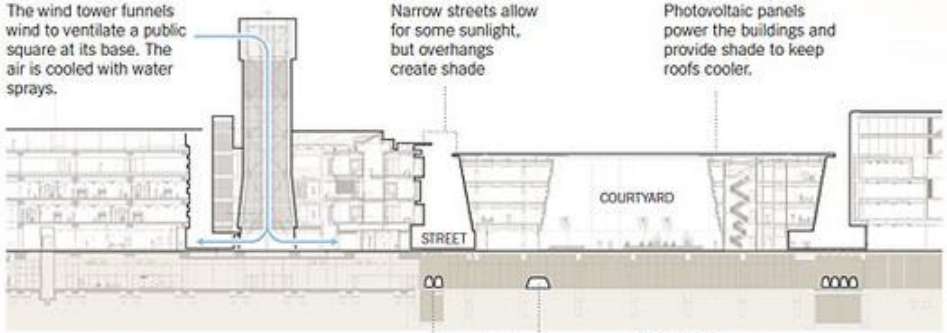
The city is surrounded by recreation areas, power generation facilities, parking garages and food production areas.

A light rail line will pass through the center of Masdar, linking it to downtown Abu Dhabi and providing transport within the new city.

The wind tower funnels wind to ventilate a public square at its base. The air is cooled with water sprays.

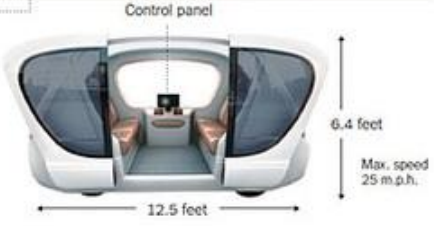
Narrow streets allow for some sunlight, but overhangs create shade

Photovoltaic panels power the buildings and provide shade to keep roofs cooler.



Automated cars with room for four adults.

Automated transportation
Masdar will be using an automated system of electric vehicles, including passenger cars and freight trucks. The city's ground level was elevated 23 feet, and the vehicles will operate underneath.



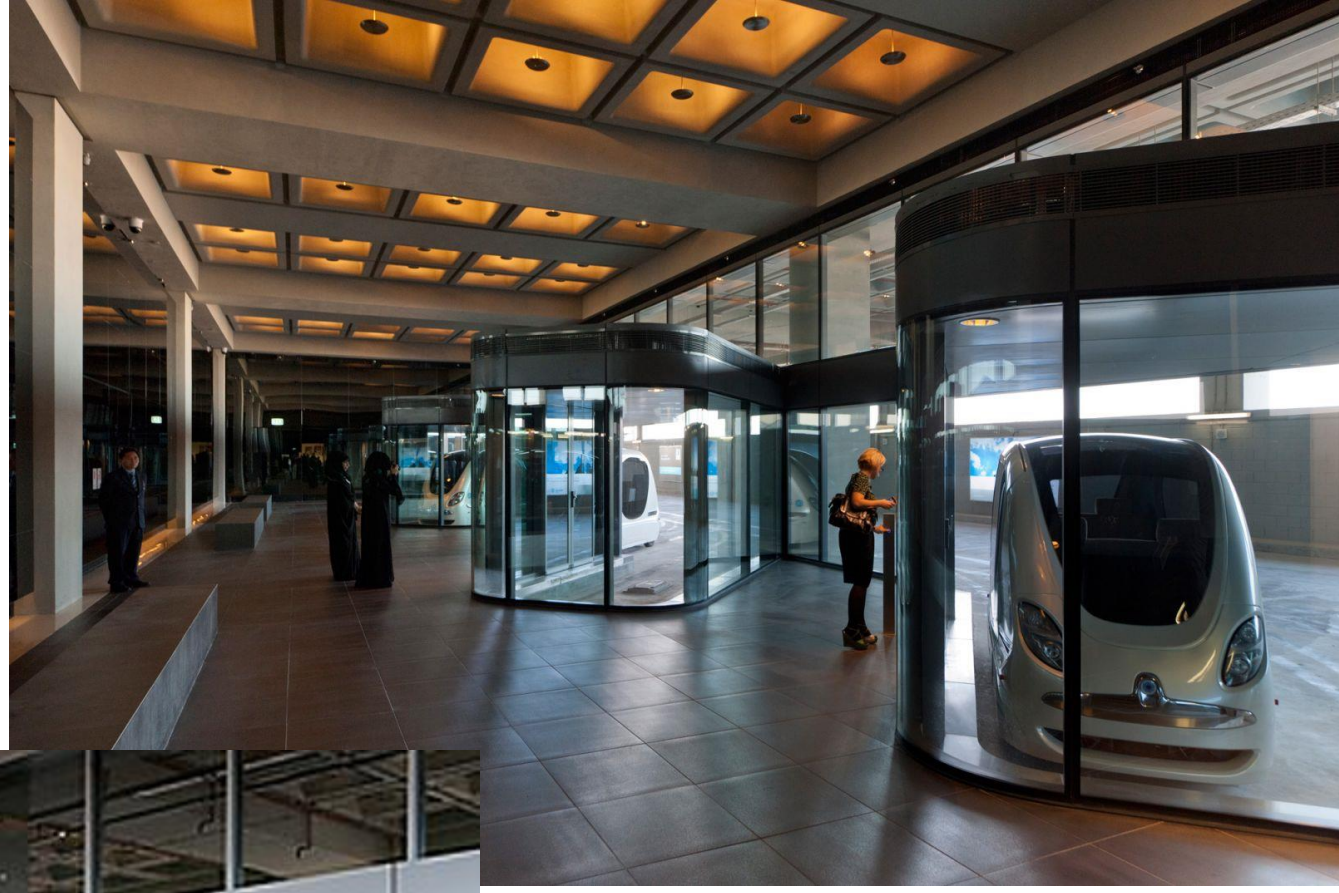
Masdar Headquarters
Photovoltaic panels on Masdar Headquarters, the city's biggest office building, are expected to produce more energy than the building consumes. It is scheduled to be finished in 2013.

Wind cones will provide natural ventilation and soft daylight to the building's interior.

Planta Solar de 10 MW

- 220,000 metros quadrados
- Conectada na rede

PRT
Private
Rapid
Transport



Ruas estreitas

Edifício sede da IRENA

Solar water heater system produces heat equivalent to **27,850 kWh** of electricity per year

75% of the heat energy in the exhaust air is recovered by the air conditioning system

Up to **95%** of energy generated from lowering elevators is harnessed and reused throughout the building

75% of the building's hot water demand is supplied by solar water heaters

The 1,000m² solar PV rooftop system produces **305,000 kWh** of electricity per year

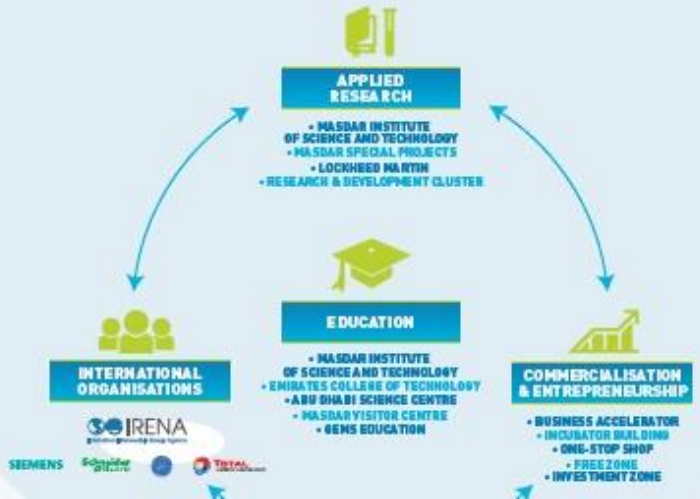
Features charging stations for electric vehicles **26**

Uses **64%** less energy than typical buildings in Abu Dhabi

Requires **50%** less water than typical buildings in Abu Dhabi

Uses **42%** less energy than global energy-efficiency standards

IRENA - An Integral Part of Masdar City's Ecosystem



- IRENA is a global hub for renewable energy cooperation and information exchange.
- IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy.
- IRENA is the first international organisation to be headquartered in the Middle East.
- IRENA has worked with 90 members on regional initiatives since 2011.
- IRENA HQ is certified as the highest Estidama* design and construction rating to date.

Masdar Clean Energy

- Masdar disponibilizou mais de US $ 1,7 bilhões (US) para empreendimentos de energias renováveis para ajudar a atingir quase **1GW** de energia limpa nos Emirados Árabes Unidos e além.
- Dentro dos Emirados Árabes Unidos, os projetos Masdar Clean Energy incluem:
  - o projecto Shams 1 de energia solar de **100 MW** com Abengoa Solar e Total que se estende por mais de 2,5 quilômetros quadrados no oeste de Abu Dhabi
  - planta solar fotovoltaica de **10MW** na cidade de Masdar
  - roof-top de **1MW** nos telhados da cidade de Masdar
- Internacionalmente, a Masdar Clean Energy tem investido em projectos de energias renováveis:
  - Torresol Energy - uma joint-venture em Espanha com SENER que opera **120MW** de usinas de **CSP**
  - London Array – um **parque eolico offshore** de **650MW** no estuário do Tamisa.

Torresol Energy - 120 MW de CSP

London Array – Parque eólico offshore de 650 MW no estuário do Tamisa

Maior parquet eólico offshore do mundo

Campus do Masdar Institute

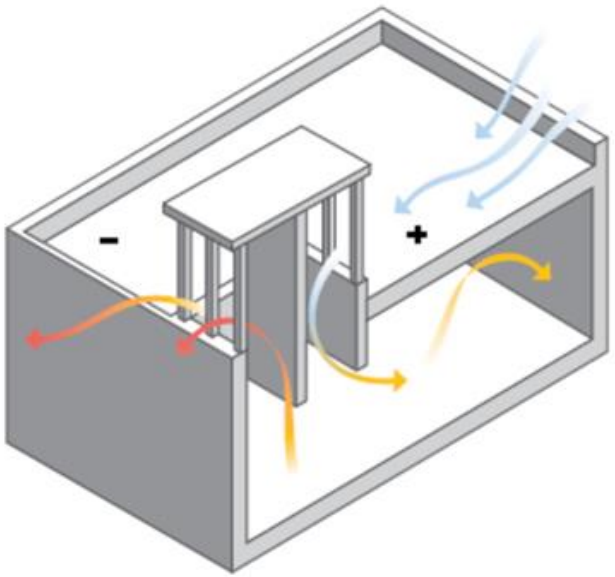
- Com tecnologia limpa na sua essência
- Foi construído de forma a consumir:
  - 75% menos de necessidade de arrefecimento do que um edifício convencional de tamanho similar
  - 70% menos de água potável
  - 95% menos de energia em água quente de uso doméstico
  - 70% menos de electricidade
- Sempre que possível, foram tomados em consideração fatores sustentáveis, tais como:
  - reciclabilidade
  - Materiais de baixa emissão
  - Preferencia especial dada a produtos locais com materiais sustentáveis

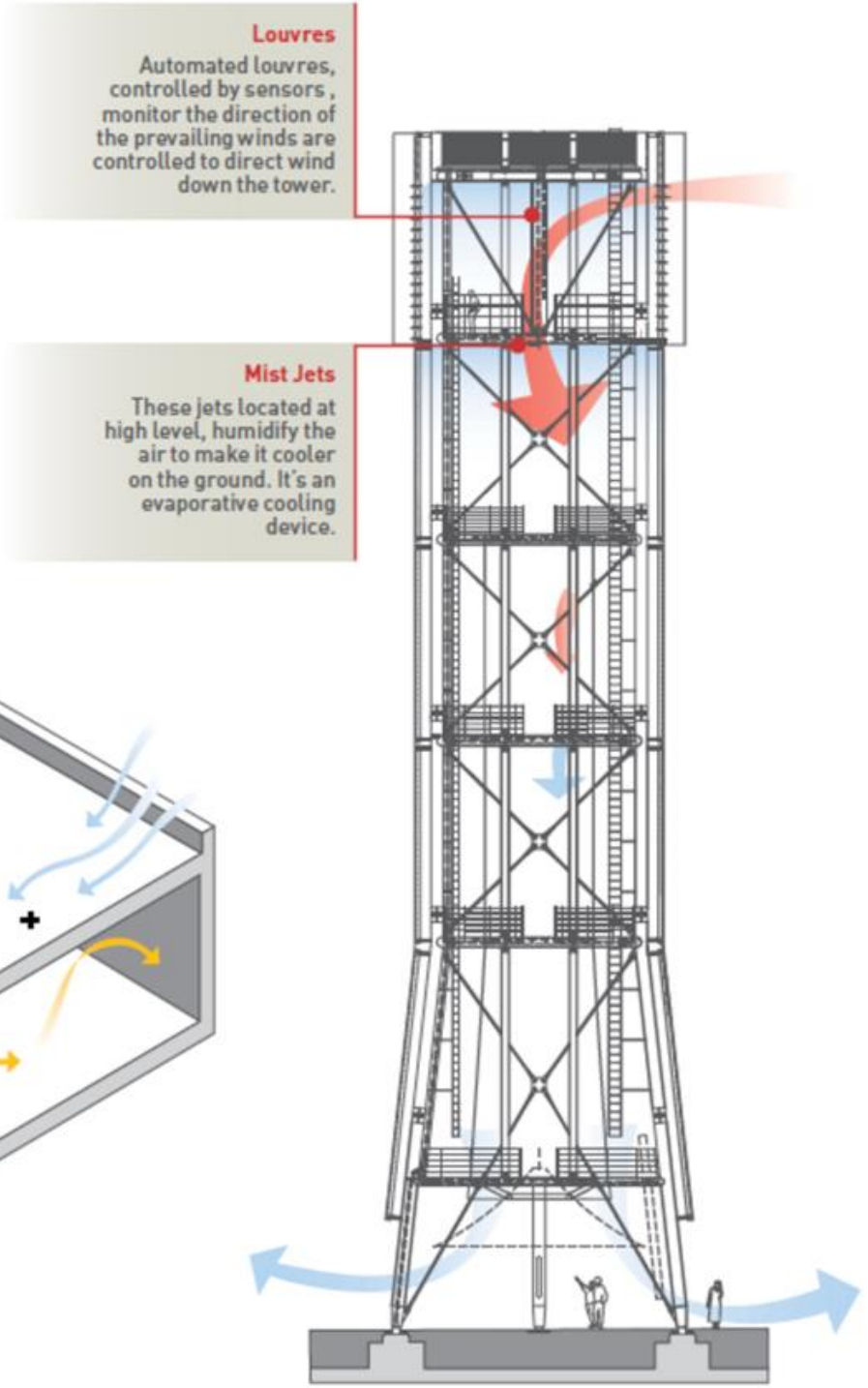
Campus do Masdar Institute

- As fachadas do edifício reduzem passivamente a transferência de calor e são altamente isoladas para manter o arrefecimento com ar-condicionado.
- Torre eólica do Masdar Institute sobe 45 metros acima do pódio, direcionando os ventos mais frios de nível superior para as ruas e praças ao ar livre na sua base.
- O campus universitário é conceituada em torno de uma hierarquia de ruas e praças que formam o pano de fundo para um ambiente de integração, comunicação e cooperação - um lugar que é activo dia e noite.

Torre de Vento

Torre de Vento

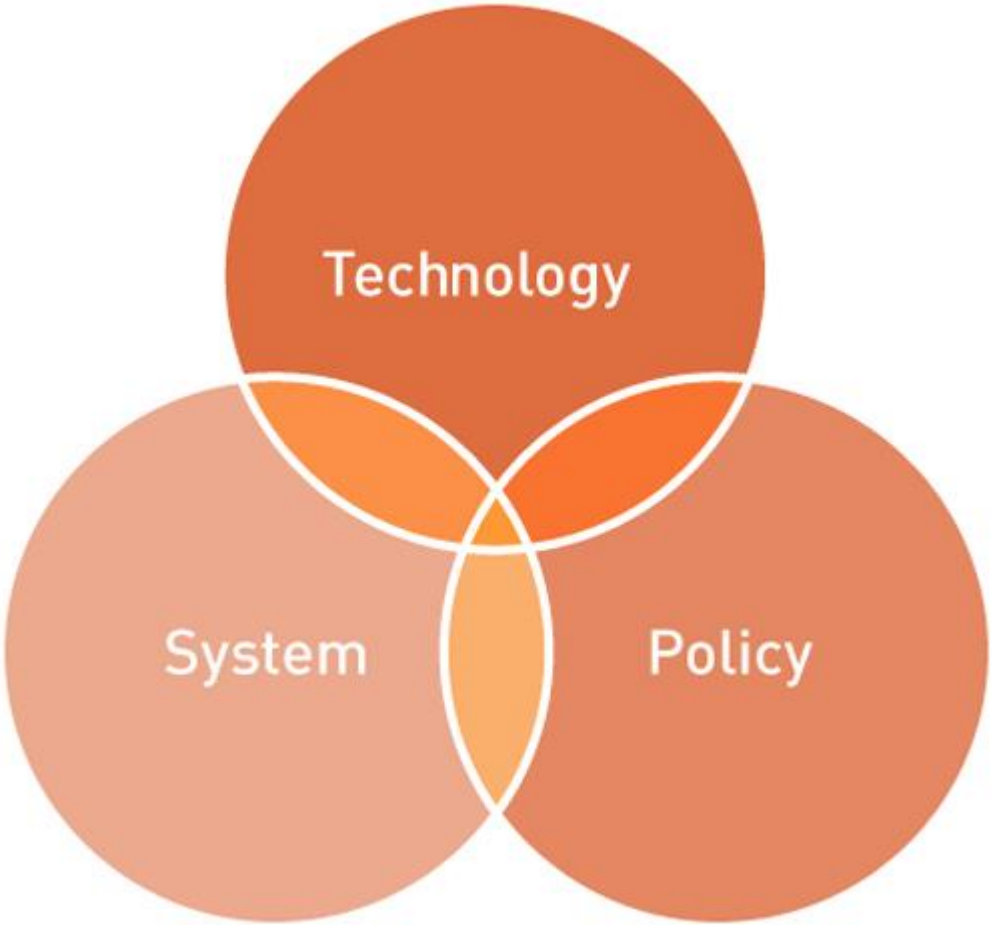




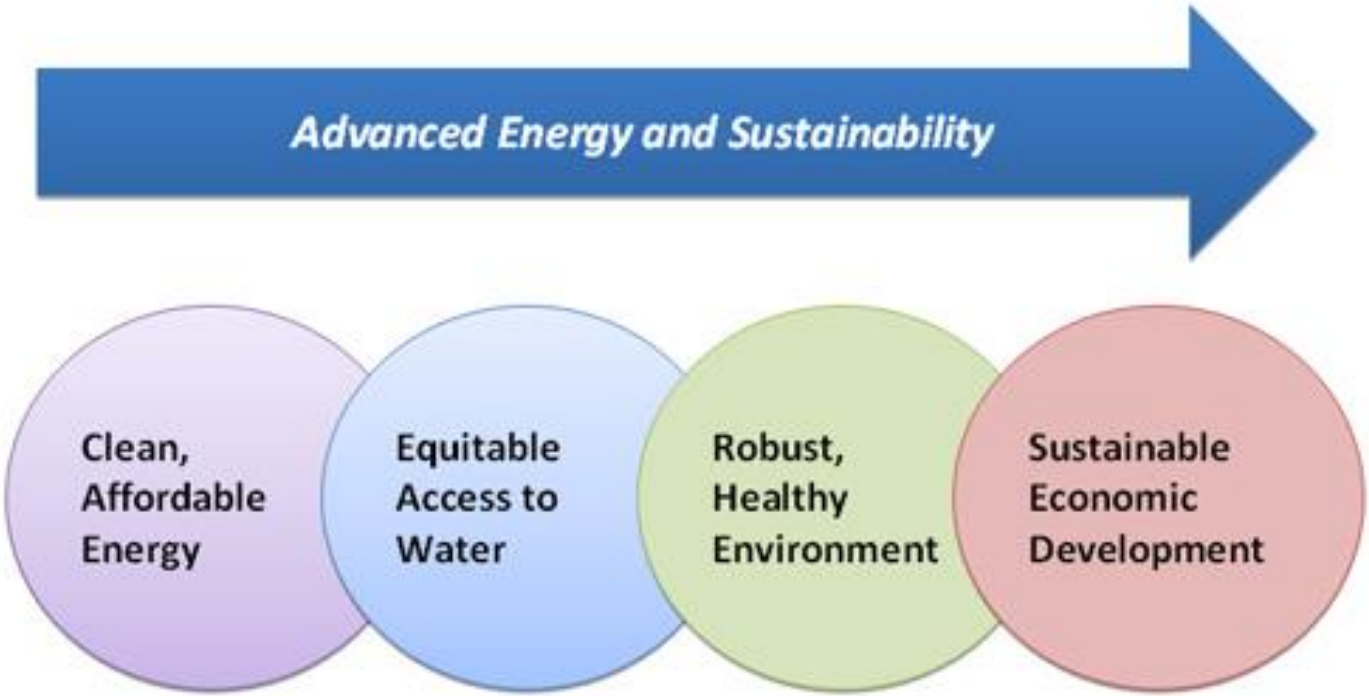
Masdar Institute

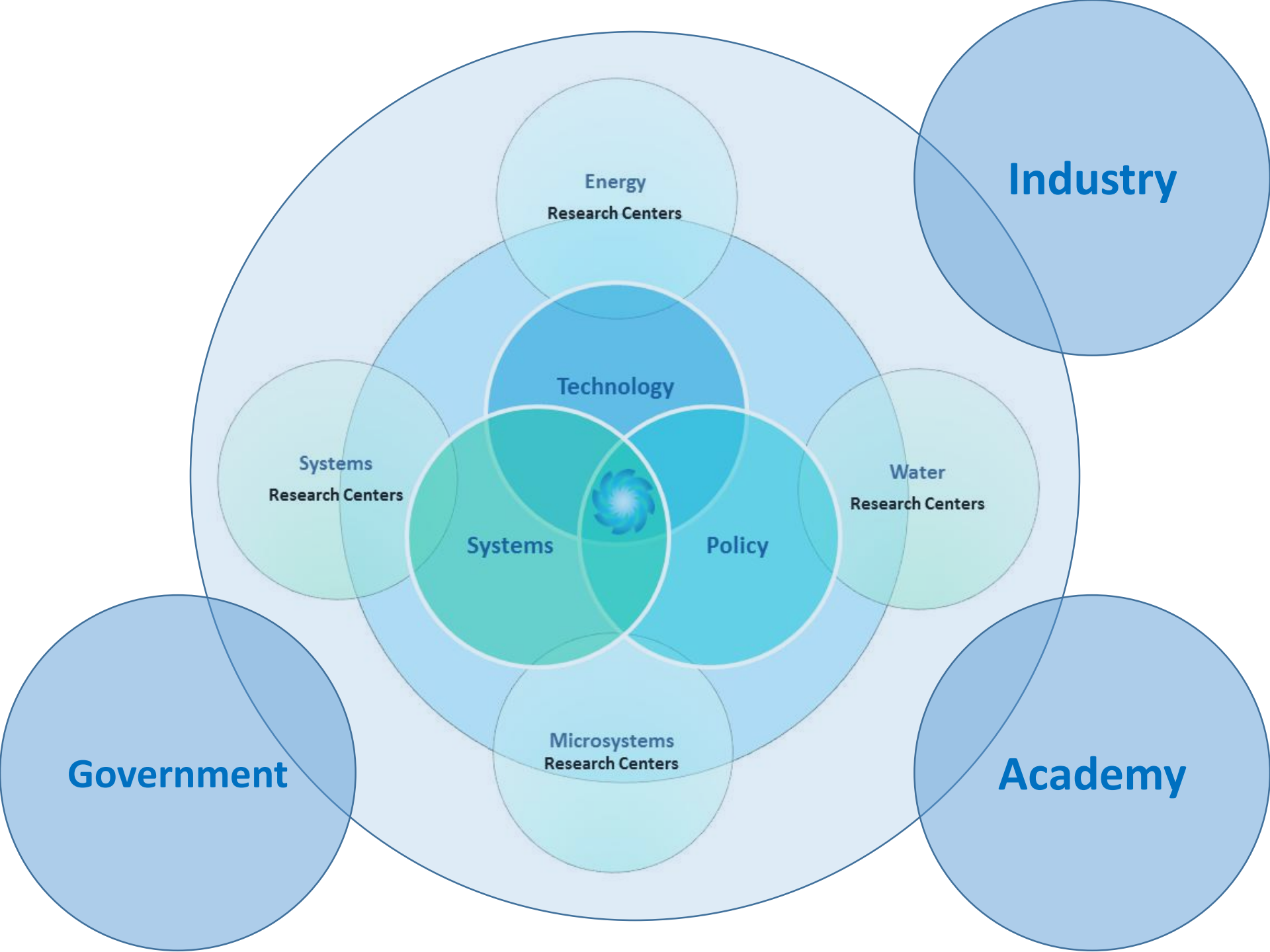
O braço de investigação

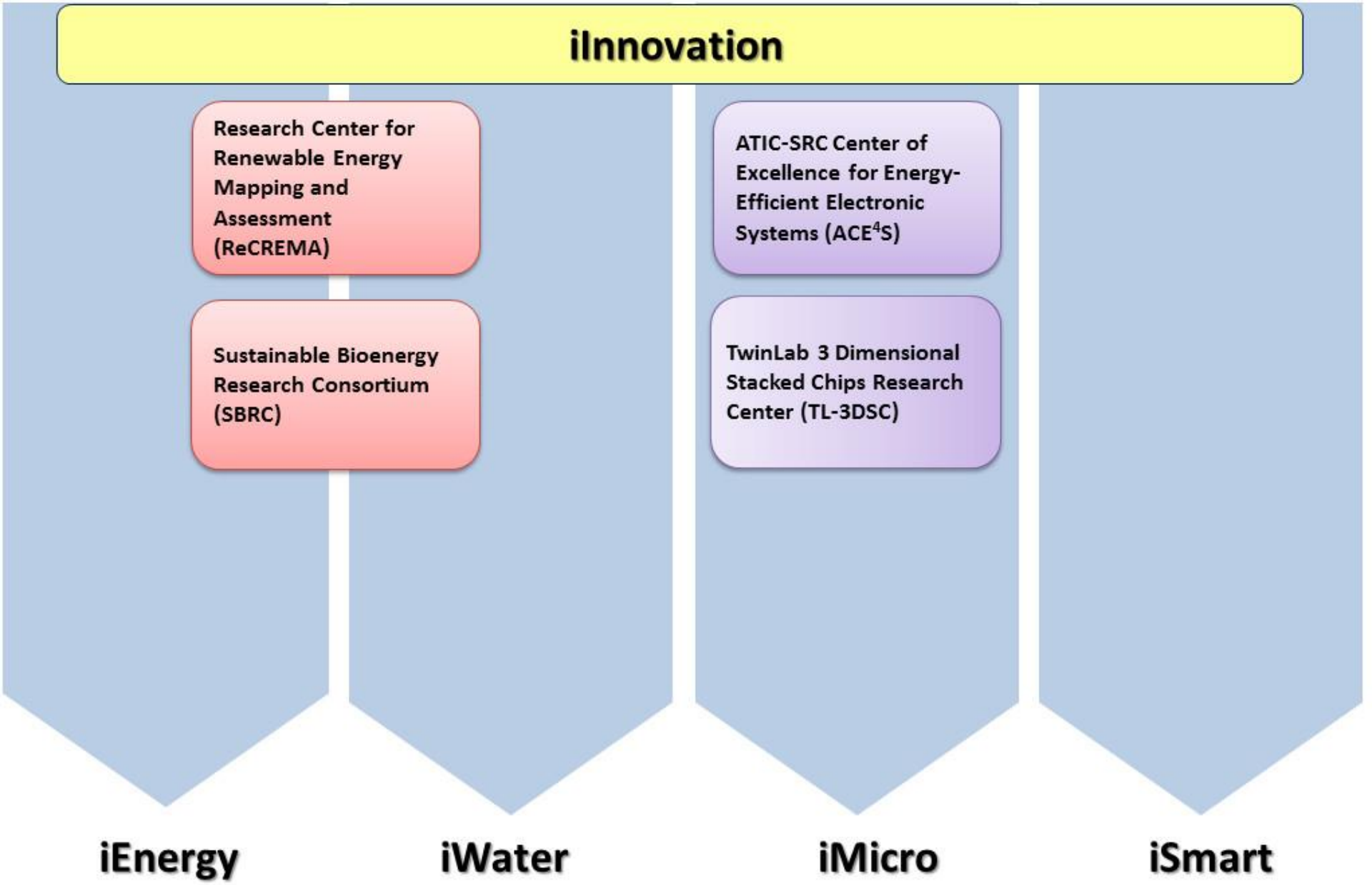
Áreas chave



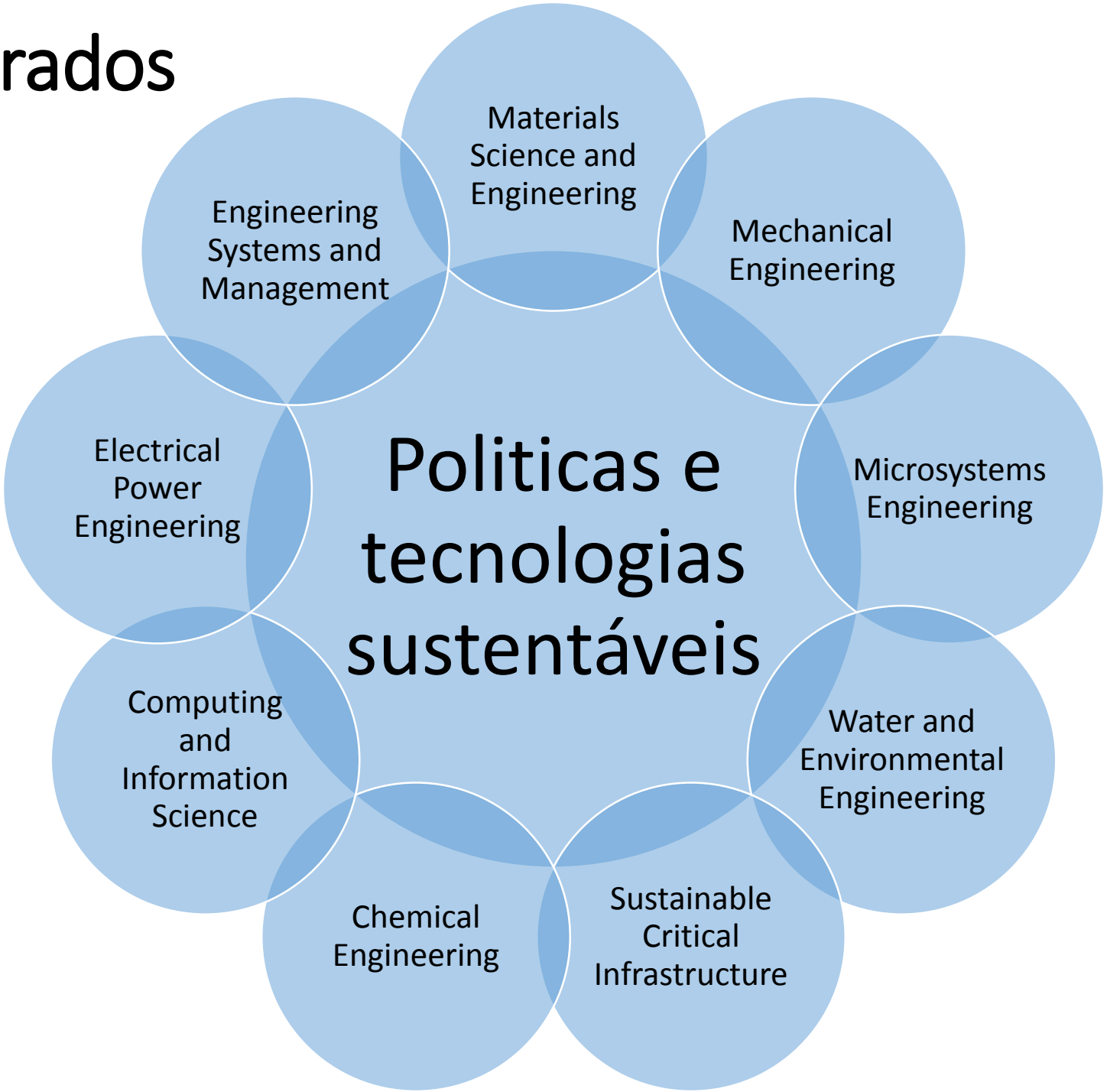
Desafios chave




Industry
Energy
Research Centers
Technology
Systems
Research Centers
Water
Research Centers
Systems
Policy
Microsystems
Research Centers
Government
Academy


iInnovation
Research Center for Renewable Energy Mapping and Assessment (ReCREMA)
Sustainable Bioenergy Research Consortium (SBRC)
ATIC-SRC Center of Excellence for Energy-Efficient Electronic Systems (ACE4S)
TwinLab 3 Dimensional Stacked Chips Research Center (TL-3DSC)
iEnergy
iWater
iMicro
iSmart

Mestrados


Materials Science and Engineering
Mechanical Engineering
Microsystems Engineering
Water and Environmental Engineering
Sustainable Critical Infrastructure
Chemical Engineering
Computing and Information Science
Electrical Power Engineering
Engineering Systems and Management
Politicas e tecnologias sustentáveis

Doutorado em Engenharia Interdisciplinar

- Projetado para permitir aos alunos a flexibilidade necessária para responder a esses problemas complexos cruzando as fronteiras de mais de um programa academico tecnico e/ou científico

A cidade de Masdar como um laboratório vivo

Tinta refletora pode cortar a temperatura dos telhados em 20%

Solar Beam Down Power Plant

Obrigado pela atenção

Questões?

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