

مدينة الملك عبد الله للطاقة
الذرية والمتجددة K.A.CARE



The Proposed Alternative Energy Mix

A Roadmap for Sustainable Development

تنشأ مدينة علمية تسمى مدينة الملك عبدالله للطاقة الذرية والمتجددة.

الأمر الملكي رقم أ/35 في 3 جمادى الأولى 1431هـ



"...there shall be established a scientific city to be called, King Abdullah City for Atomic and Renewable Energy" Royal Decree No. A/35 3/5/1431 A.H.

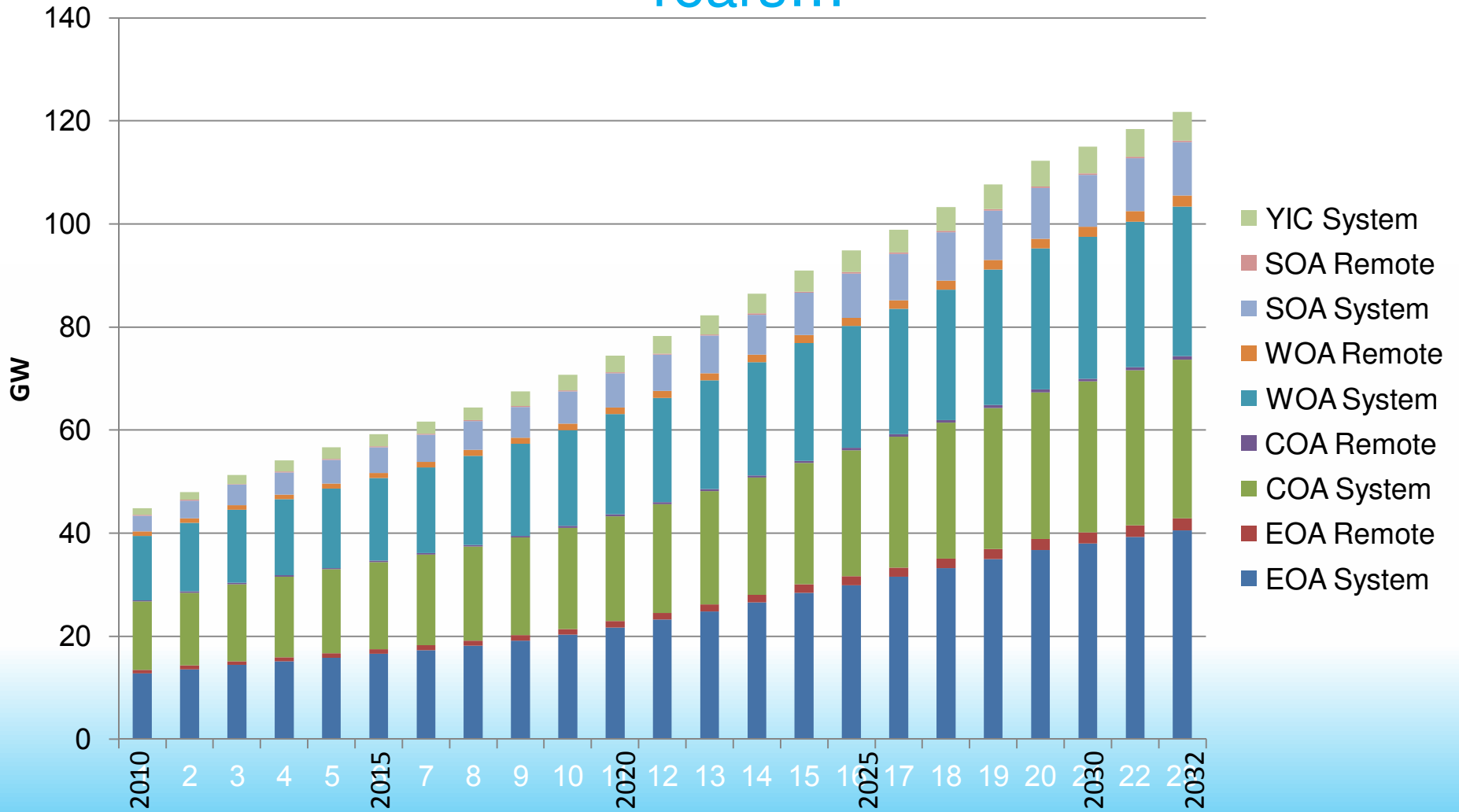


Established by Royal Order April 17,
2010, the Mission is to be:

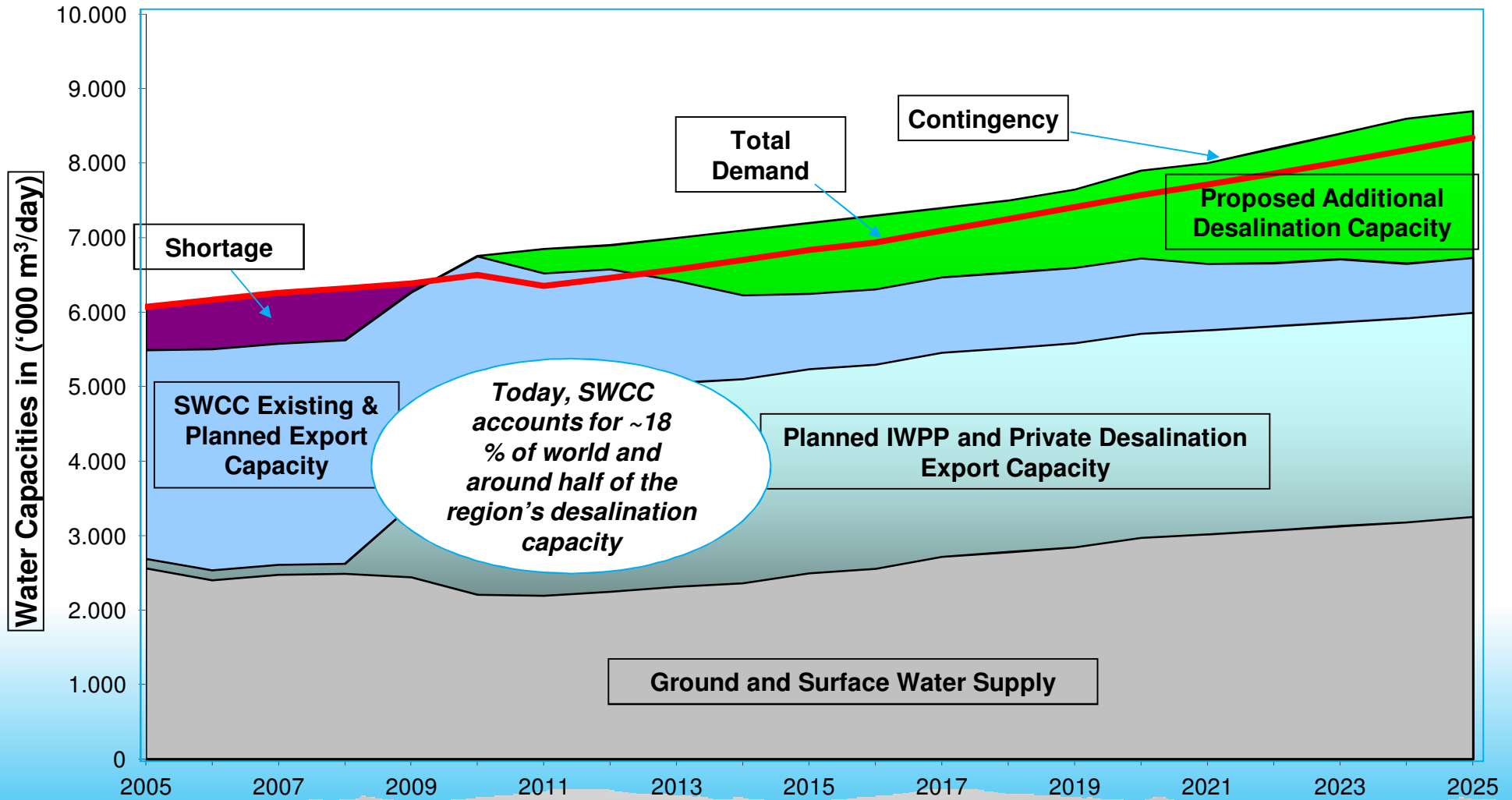
“ The driving force for making atomic and renewable energy an integral part of a national sustainable energy mix, creating and leveraging the competitive advantages of relevant technologies for the social and economic development of the Kingdom of Saudi Arabia... ”



Peak Power Demand Will Nearly Triple in Next 20 Years...



KSA Total Water Demand Versus Planned Supply Sources



Today, SWCC accounts for ~18 % of world and around half of the region's desalination capacity



K·A·CARE Mandate

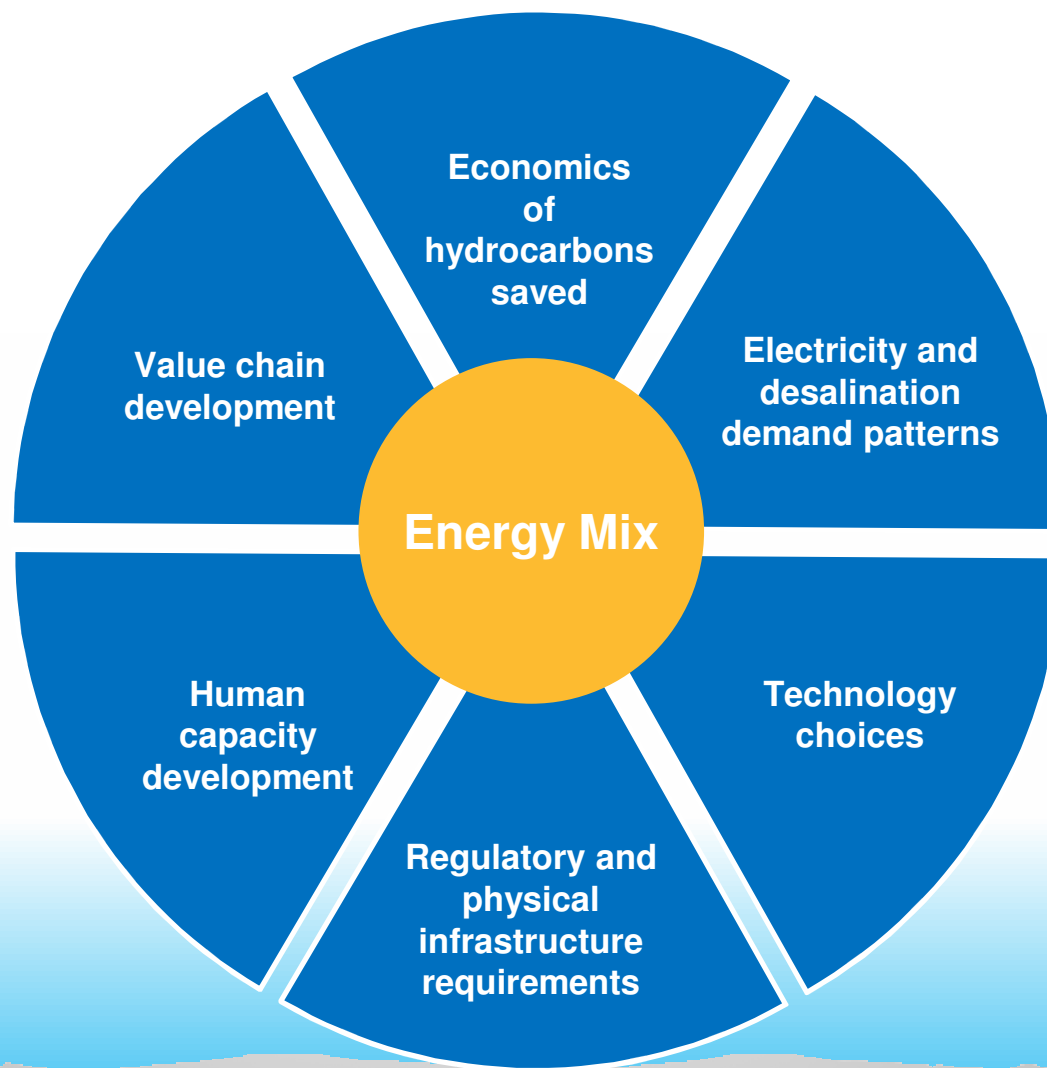




Alternative Energy Development



Criteria for Energy Mix Selection



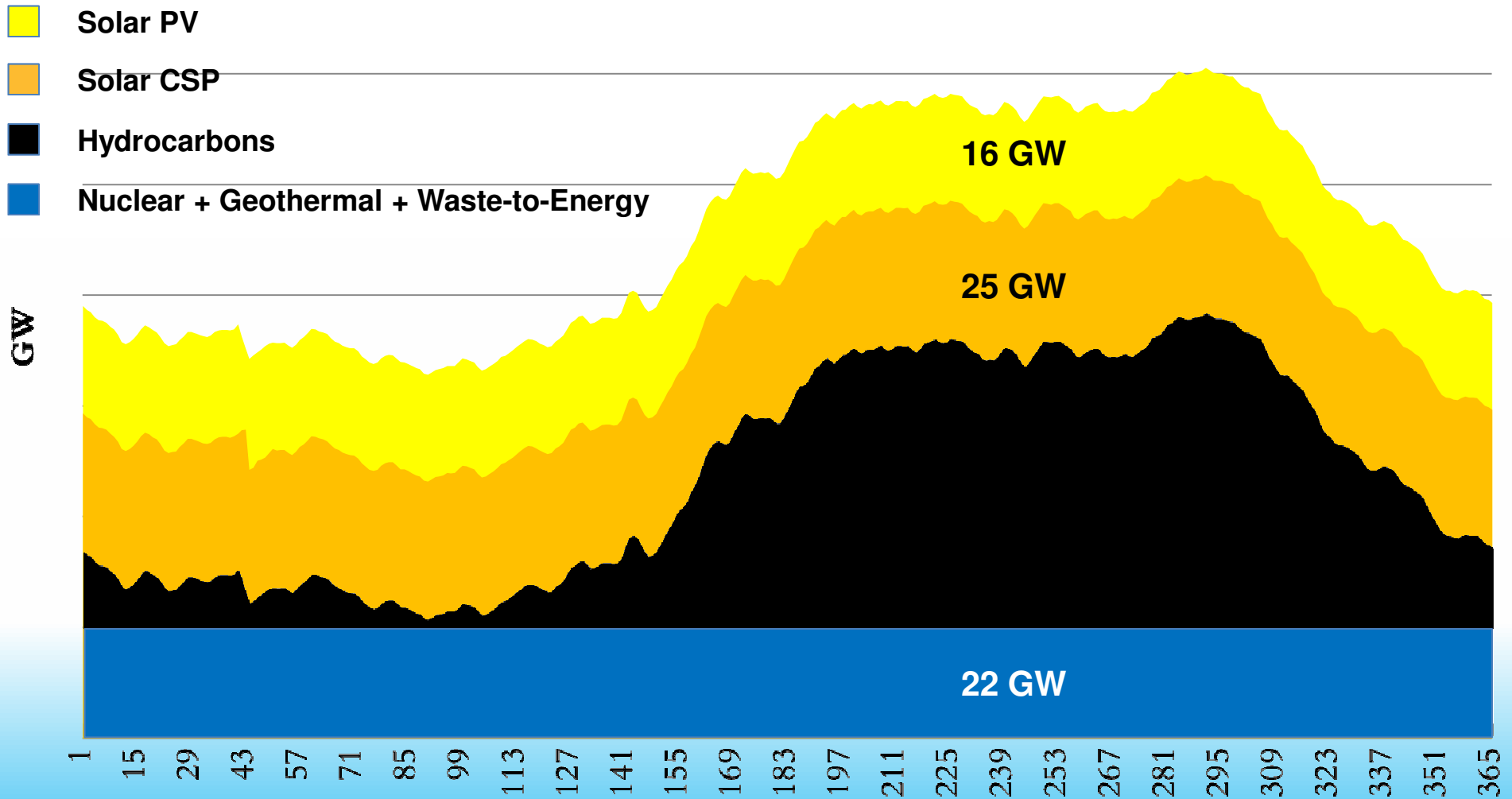
Target Alternative Energy Capacity by 2033

Maximizing solar deployment potential

Nuclear	18 GW
Renewable	54 GW



Proposed Energy Mix



Alternative Energy Value Chain Development



Alternative Energy Value Chain Localization Tenets

K.A.CARE value chain localization
roadmap is built on four bases:

Manufacturin
g

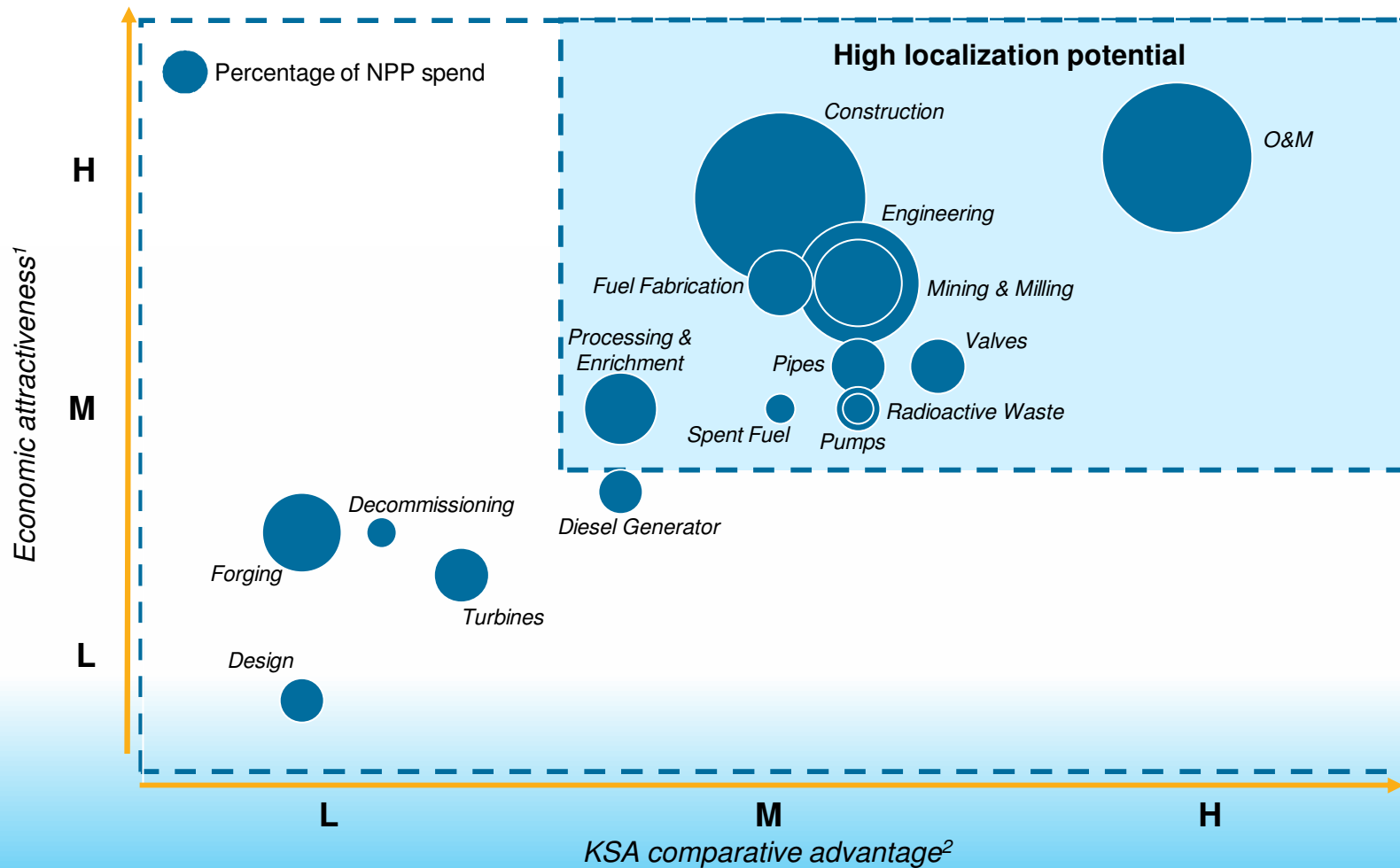
Services

Technology

Human
Capacity



Value Mapping of Nuclear Spend

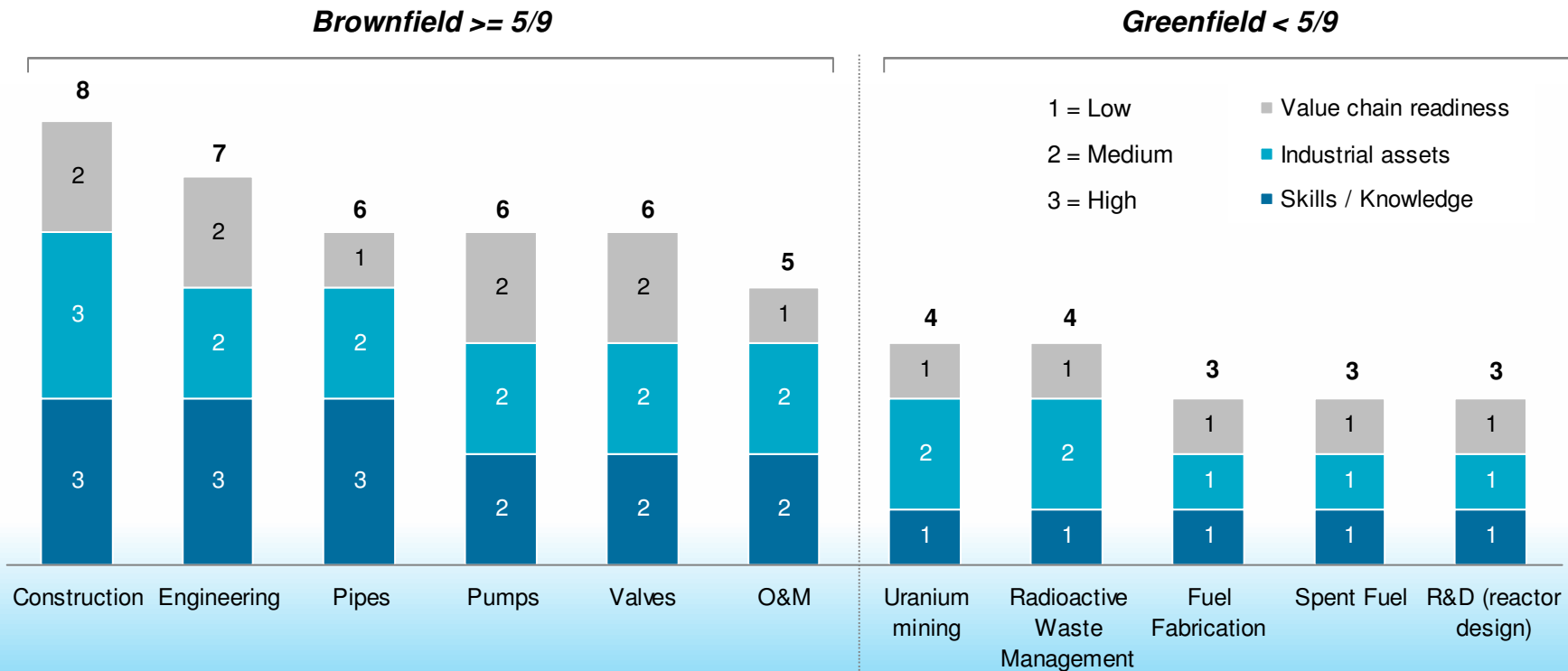


1. Based on average score from market, financial, KSA impact dimensions; main drivers include NPV, IRR and payback calculations
 2. Based on average score from technology and KSA gaps dimensions; main driver is feasibility for KSA to compete globally



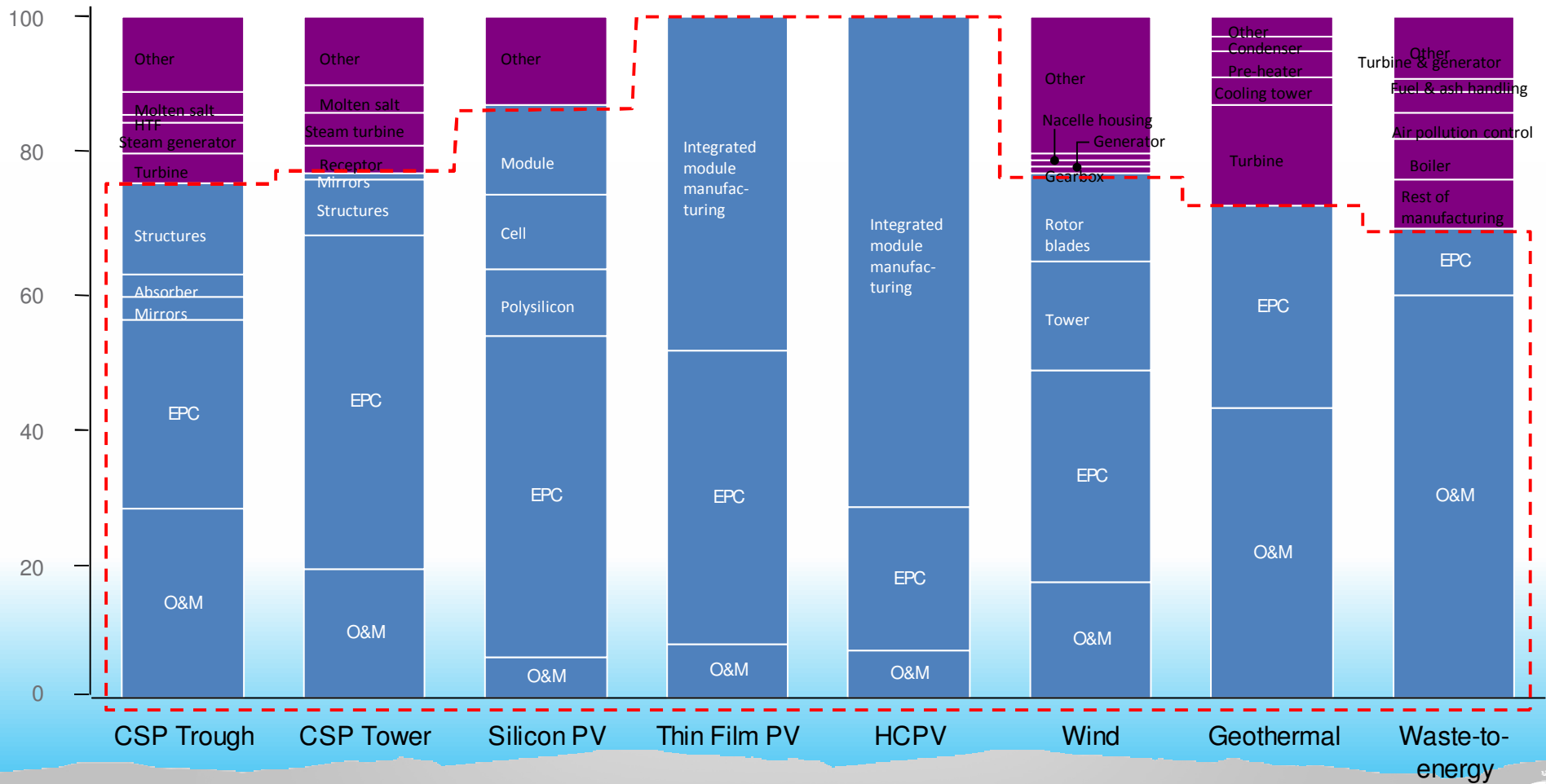
KSA Industrial Readiness NE Summary

Industrial readiness scoring



Manufacturing, EPC and O&M split

% total capex and opex throughout the plant lifetime



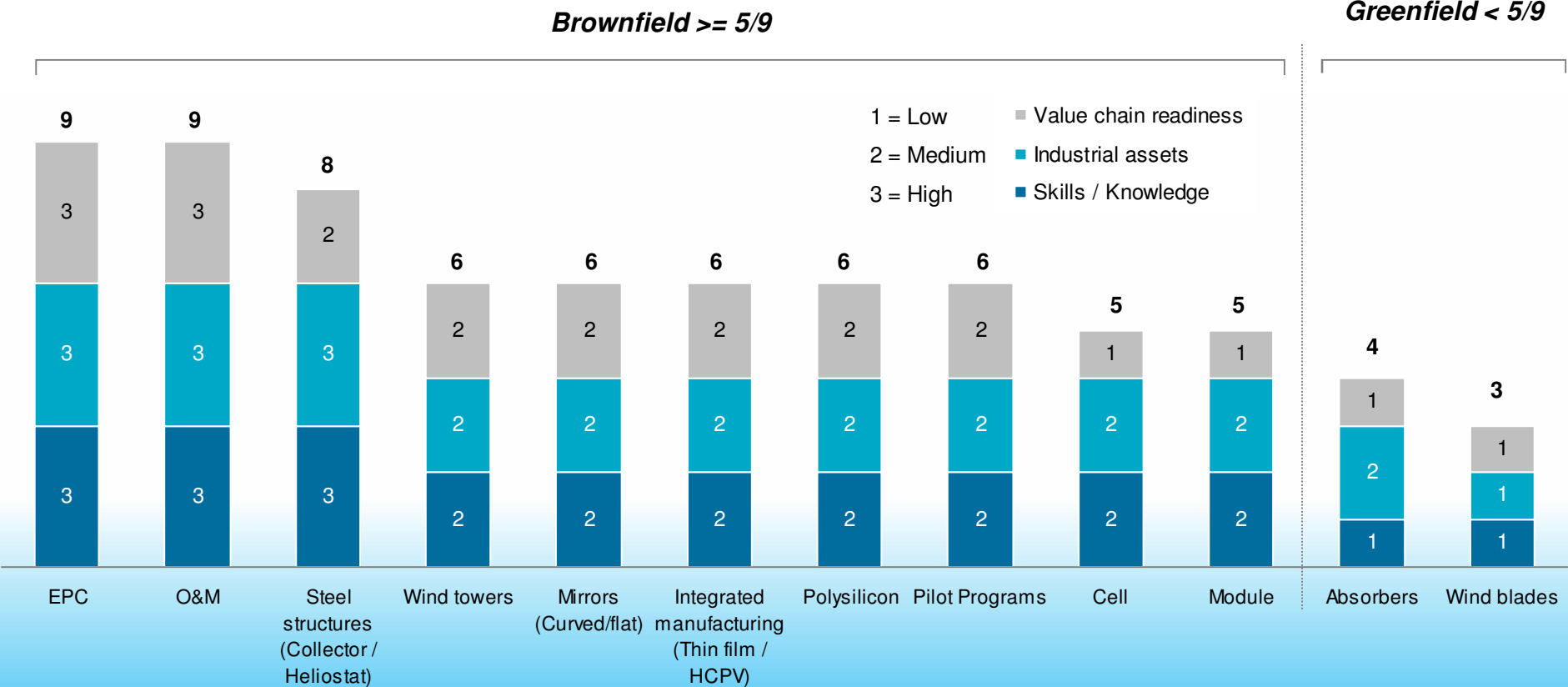
Core Localization

Localization not considered for industrial impact



KSA Industrial Readiness RE Summary

Industrial readiness scoring



Research Development and Innovation



K.A.CARE RDI Plan

K.A.CARE Mandate



Immediate Start Projects, Round 1

Project Reference	Immediate Start Project Title	Links to Research Program	Project Type	Potential Engagement Tools
2013-02 PV Testing	Design and development of a standardized photovoltaic performance and reliability testing program and initiation of a photovoltaic certification program	RE.2.1	Data & Infrastructure	Collaborative Industry Cooperative Fellowships
2013-03 PV Materials	Coatings, packaging solutions, and materials development for application of PV and CPV panels in Saudi Arabia	RE.4.1, RE.4.3	Innovation	Collaborative Fellowships Industry Cooperative
2013-05 Building Models	Analysis of building energy use patterns and models for efficiency of residential and commercial buildings	EE.2.1	Data & Infrastructure	Student Teams Collaborative Fellowships
2013-09 Desalina'n Design	Technical analysis and systems engineering design and demonstration of sustainable desalination systems	RE.8.1, RE.8.2, RE.8.3	Evaluation & Development	Industry Cooperative Collaborative Fellowships
2013-06 CSP Design	Concentrating solar power systems modeling, components testing, and pilot-scale design and demonstration	RE.3.1, RE.3.2, RE.3.5	Evaluation & Development	Collaborative Cooperative Open innovation Scholarships



Immediate Start Projects, Round I1

Project Reference	Immediate Start Project Title	Links to Research Program	Project Type	Potential Engagement Tools	Partner Type(s)*
RFP Round 2					
2013-01 Resource Modeling	Mapping and modeling for analysis and forecasting solar and wind to determine energy output for KSA	RE.1.1 RE.1.2 RE.1.3	Innovation	Open science Scholarship Blue Sky Collaborative	Universities R&D Institute
2013-06 CSP Design	Concentrating solar power systems modeling, components testing, and pilot-scale design and demonstration	RE.3.1, RE.3.2, RE.3.5	Evaluation & Development	Collaborative Cooperative Open innovation Scholarships	R&D Institute Universities Industry
2013-04 Grid Modeling	Model, design, and demonstrate a sustainable electricity grid for Saudi Arabia	RE.9.1, RE.9.2, RE.9.3	Evaluation & Development	Exchanges Collaborative Open innovation	R&D Institute Other Gov. Industry
2013-07 Efficient Cooling	Efficient and solar-assisted cooling technology development and research	EE.1.1	Evaluation & Development	Cooperative Ventures Open innovation	Industry R&D Institute
2013-08 Thermal Storage	Materials development and systems design of thermal storage and heat transfer	RE.7.1	Innovation	Collaborative Open innovation Ventures	R&D Institute Universities



Immediate Start Projects, Round II1

Project Reference	Immediate Start Project Title	Links to Research Program	Project Type	Potential Engagement Tools	Partner Type(s)*
RFP Round 3					
2013-10 Rad Contam'nt Models	Technical Underpinnings for Models to Predict Risk from Transport of Radioactive Materials or Contaminants in the Saudi Environment	NE.7.1, NE.7.3	Data & Infrastructure	Collaborative Exchanges	R&D Institute Universities Experts
2013-11 Next Gen SMR Study	Study of Next Generation SMRs for High-temperature Process Heat Applications and Zero Water Net Usage	NE.1.2	Evaluation & Development	Collaborative Expert Advisory	R&D Institute Universities Experts Industry
2013-12 Isotope Study	Study of High Purity-Low Waste Isotope Production	NE.2.1	Evaluation & Development	Collaborative Expert Advisory	R&D Institute Universities Experts Industry

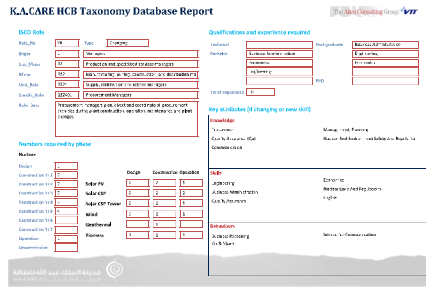


Human Capacity Development

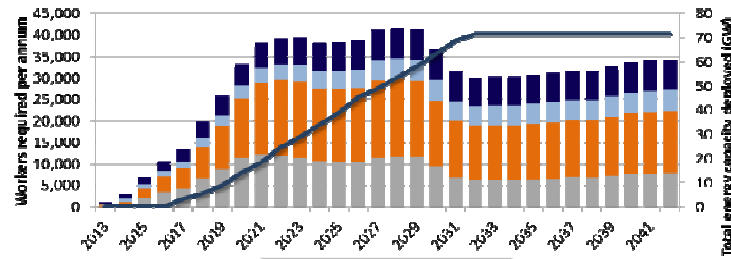


Analysis and Implementation Tools

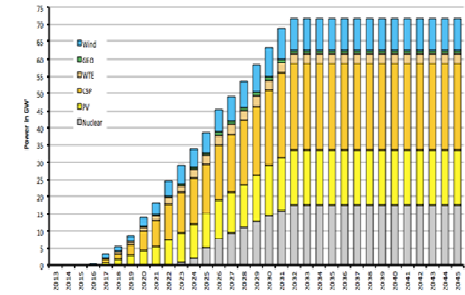
Taxonomy of Roles



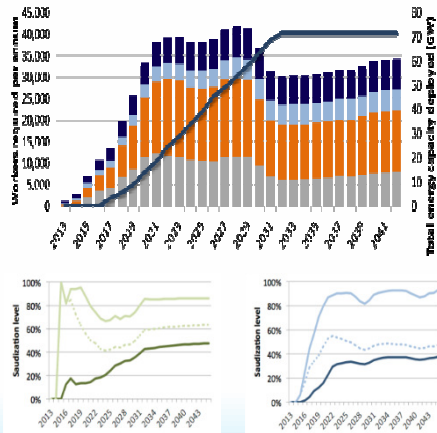
Demand modelling



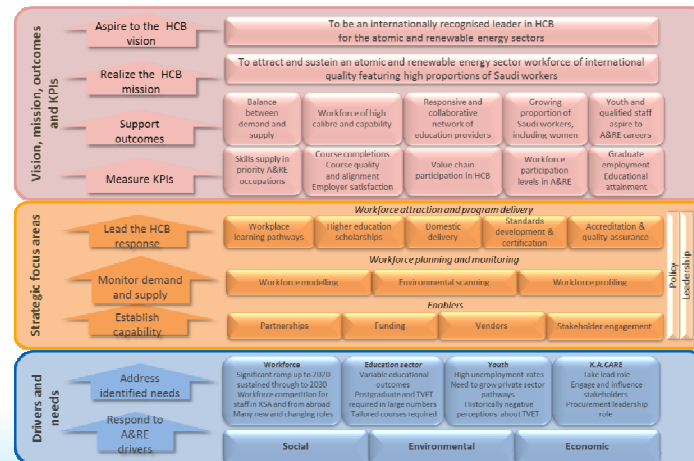
Energy deployment scenarios



Demand-Supply gap modeling



HCB Roadmap and Implementation Plans



Supply modelling



Education system dashboard

Additional work undertaken

Saudization modelling

Stakeholder engagement

Youth focus groups

Value chain & multipliers

Leading programs

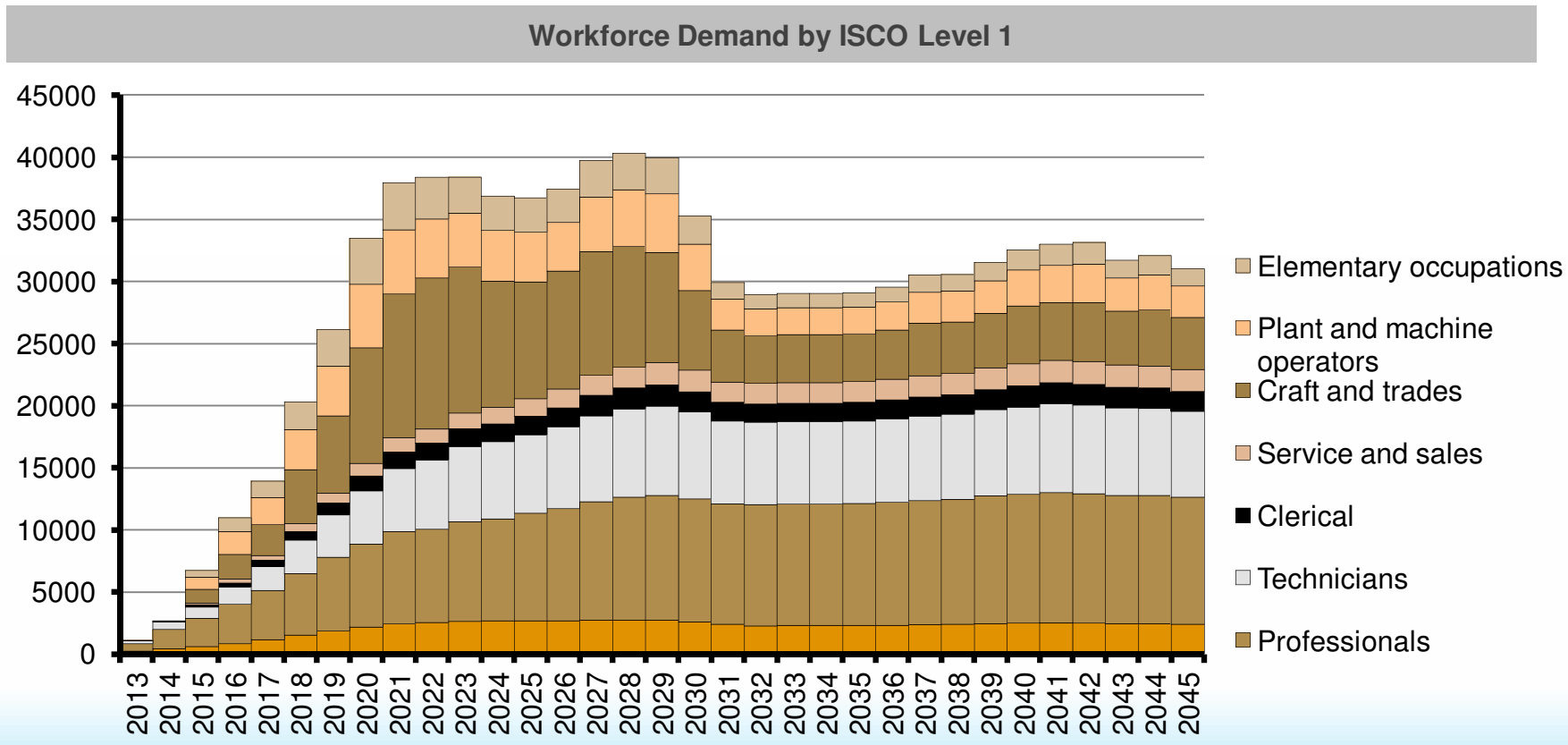
Web portal prototype

Industry and innovation

Corporate universities



There will be major workforce requirements across various categories



**A&RE energy capacity added
71.6 GW**

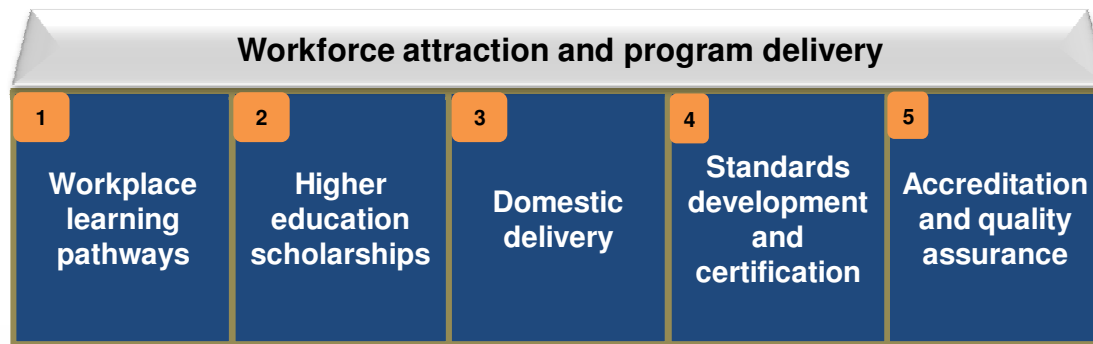
**Peak workforce required
~40,000 man years**

**Average workforce required 2020-30
~38,000 man years**

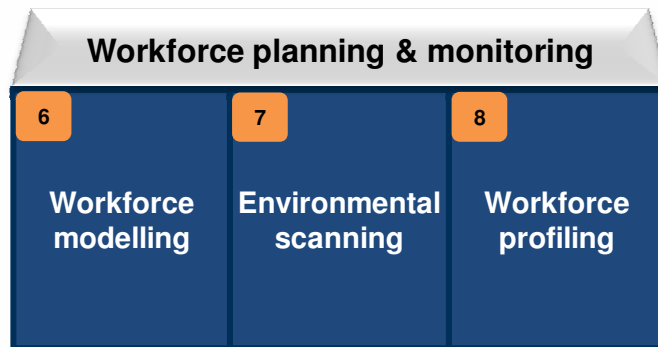
**Average workforce required 2030-40
~30,000 man years**



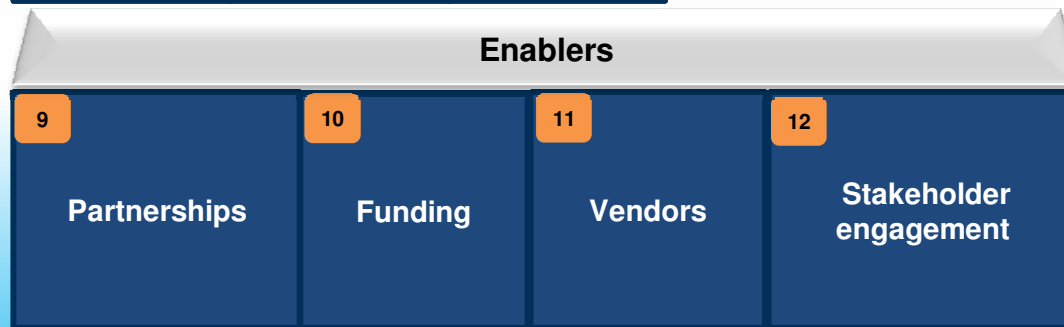
Implementation Strategic Focus Areas



Leading education and training system reform and adaptation
Establishing attractive recruitment pathways



Understanding and planning workforce and broader economy needs



Developing external support for the HCB program
Working with experienced vendors to meet specific workforce needs



The Kingdom of Sustainable Energy



Thank You

