CAREN

CAREN helps harness Turkmenistan's sunshine

High-speed networks underpin solar technology collaboration between Central Asia and Europe for distance learning and performance monitoring

Developing alternative, greener energy sources is a key priority across the world. However many countries simply don't have the infrastructure and skills needed to create renewable energy industries from scratch. Technology, and in particular research networks, can help develop these skills, transferring knowledge to build the industry and train a new generation of local engineers, making it possible to harness freely available natural resources.

Turkmenistan goes green

Given its climate, with an average of 7.4 hours of sunshine per day, the government of Turkmenistan has made solar power its strategic focus. To develop the engineering skills and technology needed to harness the power of the sun, Turkmenistan is working closely with European experts to deliver distance learning, skills transfer and solar cell performance monitoring. All of this information and data exchange relies on the high speed, capacity and reliability of the Central Asian CAREN and pan-European GÉANT research networks, enabling seamless intercontinental collaboration.

The centrepiece of the Turkmen solar programme is the Gün (Sun) Institute in Ashgabat. Created by the Turkmenistan Academy of Sciences, it aims to become a centre of excellence for the emerging Central Asian renewable energy sector. The Academy also runs the TuRENA academic network that interconnects to CAREN.

Collaboration to transfer solar technology skills

Solar collaboration began in 2009 with a three year, EU-funded TEMPUS project. This brought together experts from universities in Spain, Germany, and Portugal, sharing know-how with their counterparts at the Gün Institute. It aimed to bridge the skills gap, training local engineers through distance learning as well as laying the foundations of larger scale international collaboration.
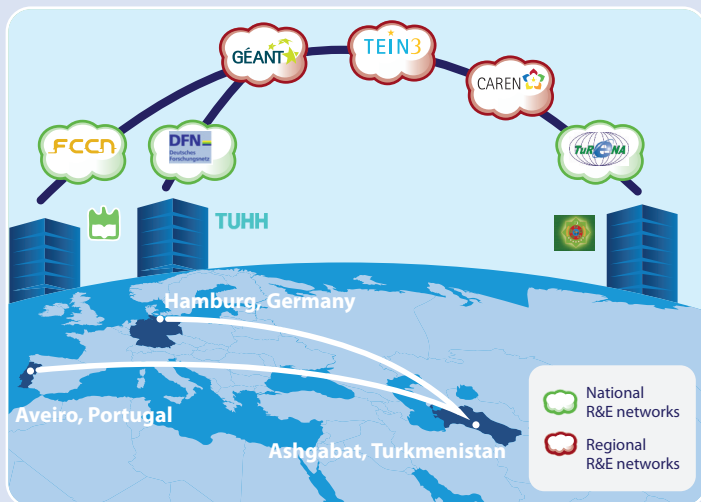

A bright future: solar pavilion in Asghabat, Turkmenistan

The Challenge: Help to develop the solar power industry in Turkmenistan through skills transfer and performance monitoring.

The Solution: The high-speed GÉANT and CAREN networks enable close collaboration between European and Turkmen institutions, creating a powerful e-learning platform to train local engineers and enabling the real-time transmission of solar performance monitoring data.

Key Benefits: Turkmenistan's Gün Institute has developed into a centre of excellence in solar power, with over 700 people trained, creating the foundations of a vibrant local solar industry.

Given Turkmenistan's unique sunny but dusty climate, European partners benefit from the chance to study how solar technology performs in a completely different setting. This two-way collaboration helps both sets of participants move forward solar power research.

GÉANT · TuRENA · DFN Deutsches Forschungsnetz · FCCN Fundação para a Computação Científica Nacional Foundation for National Scientific Computing · TUHH Technische Universität Hamburg-Harburg · universidade de aveiro

The Central Asian Research and Education Network

The route of data between Turkmen and European institutions, via dedicated national and regional research and education Internet networks.

> "Developing an innovative solar power industry is a key strategic goal for Turkmenistan. Collaboration is essential and CAREN is at the heart of our partnership with European institutions. It is enabling us to create a centre of excellence in green power that will benefit Turkmenistan, the wider region and the whole renewables sector."
>
> *Prof. Amansahedov Charyyar, Head of TuRENA, Turkmenistan*

Real-time performance monitoring

The project's first objective was to study the local performance of solar technology through the Gün Institute's solar pavilion which provides a real-time testbed to study the effects of temperature, radiation, wind speed and dust on energy production. An integral web box measures data on metrics such as humidity, solar strength, power output, temperature and atmospheric conditions. Sharing this information with European researchers continuously during daytime hours is vital, allowing real-time operational changes to be made locally to the equipment to maximise performance. CAREN and GÉANT provide the regional and international links to safely transfer this data in real time from TuRENA to European researchers, without any interruptions, network congestion or data loss that could disrupt results.

e-training: taking the distance out of distance learning

The project used the knowledge gained through performance monitoring to create e-sapak, an ICT-based e-learning platform that allows specialists from Europe to train local engineers in solar technology skills. Through e-sapak, which relies on the TuRENA, CAREN and GÉANT networks, the latest content, lessons, video conferencing and learning resources are quickly delivered from Europe to Turkmenistan. Since its introduction over 700 people have been trained, providing a core of skilled local personnel.

A bright future for Turkmenistan

The initial three year TEMPUS project has ended, but the collaboration between Turkmen and European scientists is only just beginning. Both groups are studying the performance of the solar testbed, with local students carrying out post-graduate research and colleagues in Europe conducting data analysis to shape future developments. Real-time performance data will be integral to a planned advanced control and monitoring system, which will allow operational changes to be made remotely (from both Europe and Turkmenistan) to ensure smooth running of the solar panels.

Together, the combination of e-learning and monitoring is enabling Turkmenistan to build a vibrant solar power industry. All of this relies on high-speed networks to enable the transfer of knowledge and information, bringing Europe and Turkmenistan together to deliver green energy.

> "This project provides a perfect opportunity to study the performance of solar technology in Turkmenistan's unique climate. Working with our colleagues we can see how solar equipment functions in very different conditions to Europe, enabling us to improve operational efficiency. To do this, monitoring data must reach Europe quickly and reliably."
>
> *Prof. Dr. Hanno Schaumburg, Hamburg University of Technology (TUHH), Germany*

CAREN: From ancient trade route to high-speed data network

For many centuries the Silk Road was the long-distance route for trade and communication across Central Asia, linking Europe and Asia. Today, the Central Asia Research and Education Network (CAREN) is upgrading this route to a 21st-century high-speed Internet highway for research centres and educational institutions throughout the region. Co-founded by the EC and launched in 2010, CAREN interconnects over 500 research institutes in Kyrgyzstan, Tajikistan, Turkmenistan and Kazakhstan, with Uzbekistan also a candidate country. Thanks to its interconnection with GÉANT, CAREN allows seamless collaboration between Central Asia and Europe, providing the region with a gateway to global research collaboration.

For more information:

CAREN: http://caren.dante.net
GÉANT: http://www.geant.net
TuRENA: http://science.gov.tm/en/turena
Project website: http://science.gov.tm/projects/soltme/

Academy of Sciences: http://science.gov.tm/en/
Aveiro University: http://www.ua.pt/
TUHH: http://www.tu-harburg.de
EC: http://ec.europa.eu/europeaid

EU Funded Project

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