SOLAROAD
PAVING THE WAY TO THE ROADS OF THE FUTURE

PAVING THE WAY
While TNO accelerates innovation in the management of Smart Energy, it is also developing new ways to generate the sustainable energy itself. SolaRoad is the world’s first road to create electricity and feed it back to the grid. About 70 metres of this electricity-producing road opened in the Netherlands, and this marks the beginning of the roads of the future.

EXPLORING THE POTENTIAL
As demand for energy increases, so too does the demand for more sustainable energy sources. The path to SolaRoad began when TNO asked a relatively simple question: is there a way to use existing infrastructure to generate more solar energy, with little or no impact on the landscape? Can we create self-sustaining roadways that generate electricity to power our vehicles and lights? To find the answer, TNO gathered a consortium of dedicated experts. One member of the consortium explains: ‘When TNO approached us and asked if we were interested in SolaRoad, we immediately thought: This is the future. We have to get involved.’

BEYOND THE ROOFTOPS
The Netherlands has around 137,000 kilometres (450 square kilometres) of roadway. That is nearly twice the surface area of the country’s rooftops. By paving roadways with solar panels, TNO and its partners can have a major impact on sustainable electricity production. Early testing showed that every square metre of SolaRoad has the potential to produce 50 kilowatt-hours of electricity per year in the Netherlands. But to realise an impact of this magnitude, the consortium needed to first put the right knowledge, and the right materials, together.

JOINING FORCES
The technology behind SolaRoad is innovative and inspiring. And so is the consortium that made it a reality. By forming a ‘golden triangle’ of applied research organisation, private industry and the government, the SolaRoad consortium brings together all the important players to create the electricity-producing roads of tomorrow, today.
In addition to developing the original concept, TNO contributes the organisation and management, and provides knowledge and testing capabilities for SolaRoad. Technical service provider Imtech supplies the technology to manage the generated electricity and feed it into the grid. Road construction company Ooms Civiel realises the actual integration of the components into SolaRoad elements with its road construction expertise. And besides financial support for the first pilot, the Dutch province of Noord-Holland also offers knowledge about the management and maintenance of roads, and the location for the first 100 metres of SolaRoad in the world: a bicycle road in Krommenie, in the municipality of Zaanstad.

SAFETY FIRST
Together, the consortium developed, tested, and modified the materials that make up SolaRoad. SolaRoad prototypes were tested against the same metrics for safety and comfort that are used in ‘regular’ road production. Requirements for skid-resistance, durability and sustainability were always top of mind. The materials laid in the bicycle path in Krommenie meet these standards across the board.

BUILDING THE FUTURE
Each prefabricated module of SolaRoad consists of a concrete housing that measures approximately 2.5 by 3.5 metres. Inside are the silicon solar cells, as well as protective materials. The top layer is made of tempered glass with a ruggedised surface, to ensure optimal sunlight harvesting, while meeting the safety standards for existing roads.

SolaRoad collects sunlight that can be converted into energy for use near the road itself (e.g. for lighting, traffic signals, signage) or in nearby households. In the future, electric cars could even use the energy it generates while driving upon SolaRoad.

FORWARD MOTION
Although the SolaRoad project is only beginning its three-year pilot in Krommenie, the consortium is already seeking opportunities to further develop the concept and explore the opportunities created by SolaRoad. The first innovations will come from wider-scale application of the current SolaRoad technology. Both longer stretches of bicycle path and pilot testing and development of other types of road – such as bus lanes, parking lots or small local roads – will provide data that is crucial to further development.

Next, innovations in materials, techniques and usage can make SolaRoad even more efficient or more cost-effective. New materials or methods for construction can increase energy production and reduce costs, and product development can lead to more market innovations. As SolaRoad develops, it will act as a knowledge roadmap, leading to a Business Model for further development and improvement.

WORLDWIDE IMPACT
SolaRoad is a remarkable advancement in sustainable energy. By converting existing infrastructure into a source of electricity production, SolaRoad will serve to support innovative developments in sustainable energy. But only collaboration and cooperation will accelerate innovation at the pace that is necessary to affect real change. TNO invites stakeholders from across the value chain to get in touch. With every new idea, material and vision for SolaRoad, the road to the future becomes more accessible.