

A nighttime photograph of a cityscape featuring a prominent bridge with blue lighting over a body of water. Light trails from vehicles on a nearby highway are visible. The background shows various city buildings and streetlights.

› TNO GLOBAL CONSULTANCY IN SUSTAINABLE ENERGY –

Emile Elewaut
May 11th, Kopenhagen

TNO innovation
for life

GOOD AFTERNOON AUDIENCE

- › Emile.Elewaut@tno.nl
- › Director International Affairs at TNO Energy
- › I have worked in over 50 different countries around the world

TNO

ROLE AND MISSION

- › TNO was created back in the 1937 as:
 - › a scientific support and accelerator to the Dutch Small and Medium Size industrials
- › It grew into a large organisation acting as think tank and innovator
- › We operate along two types of “projects”
 - › Where the industry tells us we have a problem, can TNO solve it
 - › Where we as TNO have an idea and ask the industry for support.
- › TNO receives funding from different Dutch Ministries
- › Executed under the contract rules of TNO

LESSON LEARNED

- › TNO is historically very dutch and because of subsidies, more focussed towards dutch government
- › TNO general rules for contract research are always in conflict with international cooperations



Copenhagen

Highlights for today's presentation

- › Qatar office as an example of industrial international business
- › Aruba as an example of societal impact business
- › TNO innovation for development



The Qatar office

- › Came as an obligation: we entered Qatar with a big project on CCS (enhanced oil)
- › The operator asked for a project leader on the spot
- › Over the past six years we had a turn over of some 2 million
 - › Food
 - › Energy
 - › Water



Lessons learned

› Staff

- › How to find someone, fit for purpose, willing to stay abroad for years
 - › Reintegration of staff

› Language

- › Is always a barrier

› Culture

- › Conflict between different cultures, everywhere you go - not only Middle East



Copenhagen

Aruba: One happy island

- › 100.000 inhabitants
- › 1.000.000 tourists
- › Prime minister Mike Eman: Aruba will be a sustainable island by 2020

Living Labs: moving sustainable solutions from concept to practical application

**Technology
Testing**

**Social
Adoption**

**Economics
& Policy**

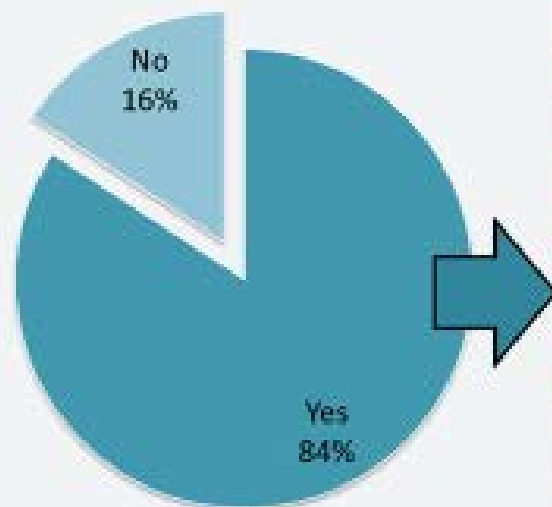


Barriers often not only technological

Social Adoption to Energy Efficiency

Aruba nation-wide Baseline Study, 2013

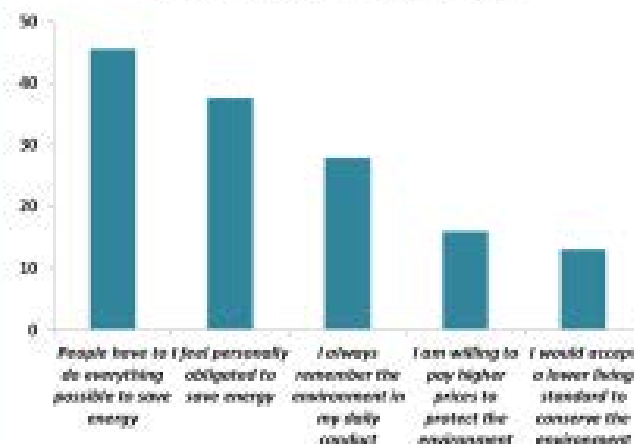
Are you currently saving energy?



How?

Application	Yes % (past year)	Intend % (next year)	No % (Not interested)
Inverter airco	38	30	13
Inverter wash	7	45	41
Inverter micro	8	33	54
Solar panels	3	30	65
Energy saving light	64	13	9
Water-saving	31	32	25
Gas-saving	6	32	52
Isolation	15	27	53
Windmill	2	14	83

Some Double Standards?





Government of Aruba

Smart Community Aruba

State of the Art in Sustainable Living

Smart Community Aruba will become a residential neighborhood developed through a partnership of different Aruban and international partners. It will function as a sustainable energy island within Aruba. The key objective of Smart Community Aruba is to research and develop scalable technology solutions and business models to make the transition to a sustainable energy system a reality.



Water purification unit

(Biogas) compost deposit

Small wind turbine

Visitor centre

Fast electric car chargers

Electricity substation & Smart Grid control

Cold storage

Housing sustainability adaptations

Irrigation water

Fibre to the Home (FTTH) at all houses

Solar energy panels on roofs

Innovative housing design



An open innovation platform

Conducting research in key innovation areas

P1 Sustainable Building



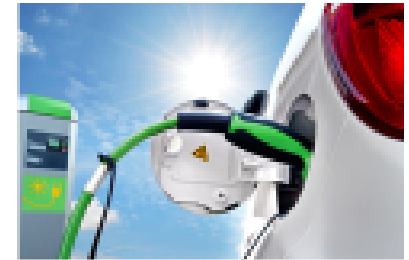
P2 Renewable Energy Integration



P3 Demand Response



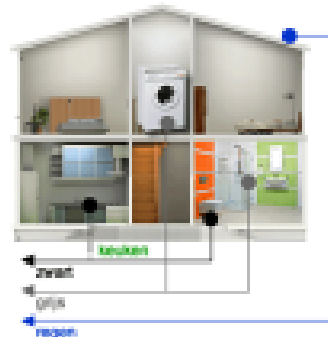
P4 Electric Mobility



P5 Human Factor



P6 Water Management



P7 Waste Management



P8 Food Supply



REQUIREMENTS FOR A SMART COMMUNITY

- › Flexibility in the building concept
- › Double commodity lines for security of supply
- › Smart meters everywhere (several in one building)
- › Contract for cooperation with tenants
- › Sponsoring
- › Industrial partners with innovative equipment to be tested/demonstrated

MICRO ALGAE PLANT



REOPENING OF THE REFINERY

- › CO2 exhaust to be captured and used
- › Microalgae, the chain:
 - › Oil
 - › Waste water treatment
 - › Biowaste
 - › Pyrolises
 - › Compost
 - › Algriculture
 - › Green houses

LESSONS LEARNED

- › The world lives by the grace of volunteers
- › Beware of politics
- › Aruba is too small for TNO
 - › Hub
 - › Financial
 - › Partners

TNO INNOVATION FOR DEVELOPMENT

- › Socio-economic **impact at low-income groups** in developing countries and emerging economies: poverty reduction, wealth and entrepreneurship
- › **Inclusive Innovation** – Inclusive Business
 - **market-based solutions:** high tech towards robust and affordable
 - with low-income groups as producer, supplier, consumer
 - new business opportunities for Dutch entrepreneurs
- › **Sustainable:** products, services, business model, scaling strategy
- › Co-creation in public private partnerships



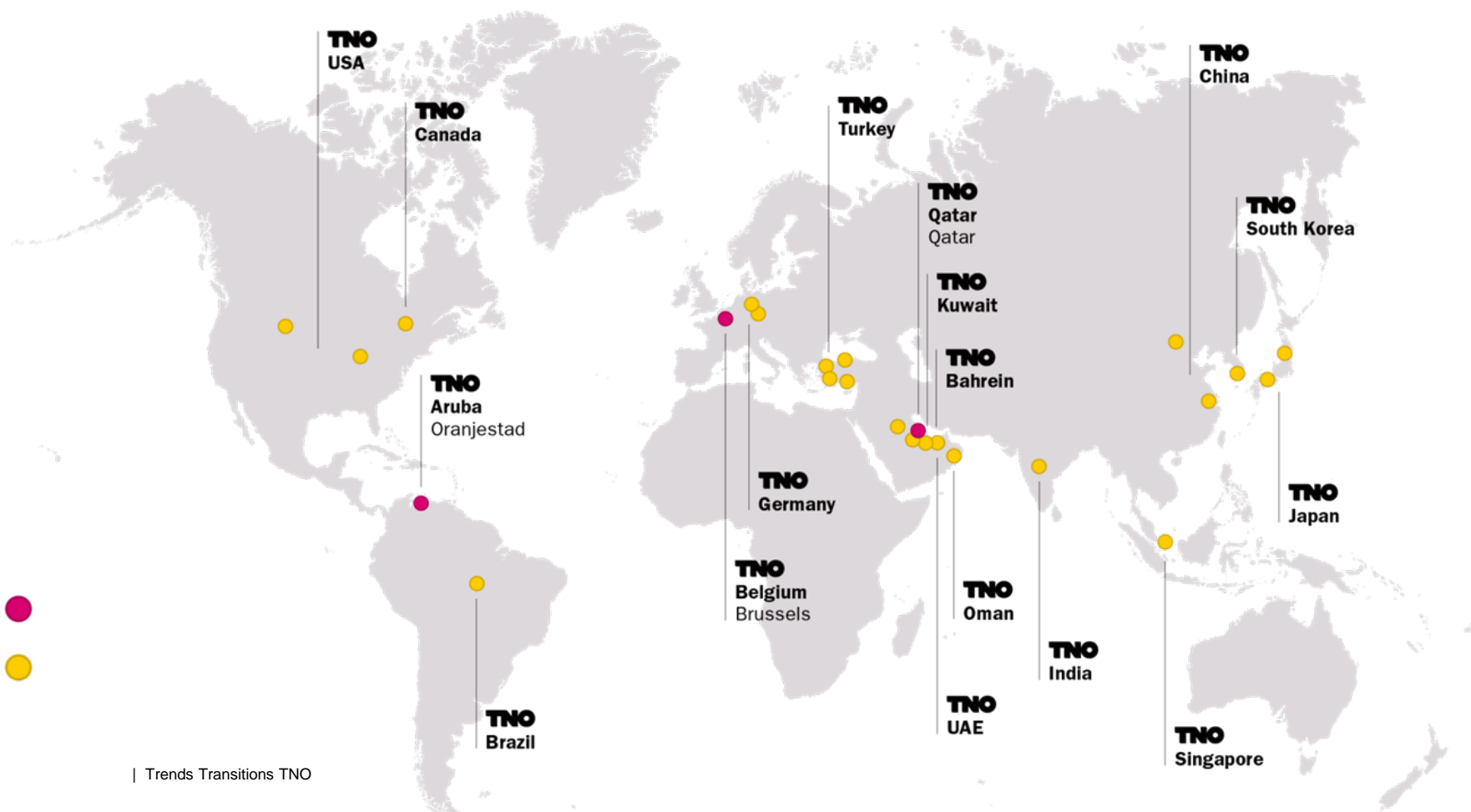
PROJECT: COOLING WITH THE SUN

- › Issue: scarcity of food, spoiling of agricultural yield at small farms
- › Solution: cold chain on sustainable, affordable energy in South India
- › Approach: with the development of cold storage and cold transport in rural areas we connect small farmers to mainstream food markets
- › 6 M€ project – with 7 partners
- › Impact: more nutritious food available for poor consumers, increased income for 10.000 small scale farmers, more business for Dutch logistic company with innovative TNO technology



LESSONS LEARNED

- › We have a wealth of dedicated staff
- › We have a wealth of experience
- › Are we the right teachers?
- › Can we find the funding?
- › Leave behind knowledge and business
- › Cooperation with
 - › Locals
 - › Local universities
 - › SME's
 - › Governments
 - › NGO's



THANK YOU FOR YOUR ATTENTION

- › International cooperation is self accelerating both over there and back home
- › A perfect school for your staff
- › International is not a waste basket but a valuable target
 - › Projects not successful here can be the ideal solution there
 - › Staff with international experience are:
 - › Better people managers
 - › More creative
 - › Less stubborn