AGENDA

8:00 am    Coffee and networking
8:30 am    Sustainable Energy, followed by a group discussion
10:00 am   Coffee and networking
10:30 am   Sustainable Tourism and assessing your country’s current situation
12:00 am   Closing discussion & evaluation
12:30 am   Closing lunch
SUSTAINABLE ENERGY
Ruurd Schoolderman
Robert-Jan Moons
### WHY RENEWABLE ENERGY?

<table>
<thead>
<tr>
<th>Reduce dependency fossil fuels</th>
<th>Strengthen internal economy</th>
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<tbody>
<tr>
<td><strong>Oil &amp; electricity price Aruba</strong></td>
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<tr>
<td><img src="image" alt="Graph of Crude oil and Electricity prices" /></td>
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<tr>
<td>- Crude oil [1]</td>
<td>- Reduce oil imports and keep energy in internal economy</td>
</tr>
<tr>
<td>- Electricity [2]</td>
<td>- Strengthen balance of payments</td>
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<tr>
<td>- Reduce risk induced by oil price volatility</td>
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<tr>
<td>- Reduce carbon footprint</td>
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5 |
AIMING TOWARDS GREATER SUSTAINABILITY

Energy Efficiency

Renewable Energy

Trias Energetica

Efficient use of fossil fuels

Source: “Roadmap Sustainable Aruba 2020”, TNO report, 2 April 2012
WEB ARUBA FUEL REDUCTION

Past & Future Results

Demand has not changed in the past 10 years

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<th>Year</th>
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<th>Oil Bbls/day</th>
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<td>2018</td>
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Sustainable Energy Road Mapping
ISLANDS DEMAND LOCAL SOLUTIONS
ISLAND SUSTAINABLE ENERGY 101

› Supply & Demand always have to be in balance
› Traditional generation offers greater control compared to renewables (intermittency)
› Renewables require spinning reserve or storage to balance supply and demand
› R.E. integration and reliability related cost increase as share of R.E. increases.
VALUE CHAIN INCREASINGLY COMPLEX

- Large Scale Renewables
- Generation & production integration
- Distribution
- Distributed Generation
- Consumption

Power flow

WEB
- Large Scale Storage (Hydrostor, Pumped Hydro)
- Vader Piet, Urirama

ELMAR
- (Airport Solar)
- WEB (P.V. Scholen, Kibaima site)

Prosumer: P.V., D.R., storage
Virtual Power Plants, micro-grids, local/neighborhood storage solutions

Consumer: D.R., E.E.

Information flow
R.E. INCREASES SYSTEM COMPLEXITY

Energy Scenario Mix

Supply and Demand Operations

Fossil Conditions
Production and Distribution

Power Production
Base Load/Intermittent Power

Load Demand Variations
Load Shedding

40% RE

Beyond 2018

Aruba Resource Integration

100% RE
ISLAND SUSTAINABLE ENERGY 101

- Small scale combined with isolation results in higher cost (redundancy for reliability, logistics)

- Small changes in R.E. can have big impacts on the system (technical, financial, social equity)

- Existing agreements and investments may have a major impact in terms of financial and/or technical lock-in

- Space, public land availability may be issue to develop R.E. resources
TAKE HOME MESSAGES ISLAND ENERGY

- Energy Balance: R.E. involves more than P.V. panels or windmills (integration & reliability).
- Local island situation impacts local Levelized Cost of Energy (LCOE)
- As R.E. share increases so does cost of integration (under current technology status)
WHY A ROADMAP? TO MANAGE RISKS

**Insular environment**
- No grid interconnections
- Independent energy system
- Relatively small energy system

**Implications**
- Greater impact renewable energy
- Greater system dynamics
- Risk of high costs if done poorly

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ROAD MAP QUESTIONS – BEFORE YOU START

- What’s your starting position?
- Where do you want to end up?
- What resources do you have to get there?
- Who are you bringing along (and what does that mean)?
- What is your timeframe?
- What are your expectations of the destination?
ISLAND ENERGY ROAD MAP STEPS

1. Commit & convene
2. Establish a leadership & technical team
3. Establish guiding principles
4. Assess current system, trends & developments
5. Island resource assessment (R.E., $$, capacity etc.)
6. Scenario development (high level)
7. Scenario evaluation, adjustment and selection preferred scenario
8. Implementation & Monitoring Strategy

Resource: Energy Transition Initiative: Island Playbook
STEP 1: COMMIT & CONVENE

- Involve essential stakeholders
- Develop locally supported solutions
- Create an open innovation platform
- Create an adaptive system
**Leadership team** – sets vision, requirements and general direction, decides
› Responsible minister, secretary or director
› Utility director(s)
› Private Independent Power Providers (if applicable)

**Technical team** – researches & analyses options based no direction; informs decision makers
› Utility technical and financial leads
› Policy lead
› External technical advisors
Energy: A basic need

- Reliable
- Affordable
- Sustainable
- Projected demand growth
- Social equity
- Energy independence / Resilience

Interest
ENERGY TRANSITIONS, LIMITATIONS

“KEEPING IT AFFORDABLE AND RELIABLE”

How keep energy and the energy system affordable?
... increasing reserve power and grid capacity is an expensive undertaking.

Sustainable

Use renewable energy sources. e.g. photovoltaics, wind- and hydropower, thermal energy, biomass, biogasses, etc.

Use energy more efficiently, e.g. by deploying heat pumps, electric vehicles, combined heat and power, etc.

Energy System

Affordable

Reliable

How to maintain reliability of the system?
... with a clear trend of electrification of energy usage and with more intermittent energy sources in the mix.
Dominant aspects so far
Most products or services
- Good
- Expensive
- Slow
- Fast
- Low Quality
Pick 2

Energy
- Reliable
- Affordable
- Sustainable

Central question: what is the right balance for your situation between reliability, affordability and sustainability?
Energy transitions, considerations

Power system: provide continuous energy at a certain voltage (120 Vac) and frequency (50 Hz).

- Robust technology
- Long life time
- Local storage of energy

Ability to perform a certain function under specified conditions for as long as possible.

- Lowest price possible
- Stable price
- Often regulated

- Abundant source of energy
- Little waste of energy
- Little impact on environment

Affordable

Sustainable

Reliable
RAS – ENERGY MIX DISCUSSION

- What are your current island’s priorities within RAS?
- How does the energy system ambition level align with finding a balance?
- What are other important guiding principles for your island in shaping your energy system?
STEP 4: ASSESS CURRENT SYSTEM & TRENDS

- Current production system (equipment & ownership, existing commitments)
- Demand profile and projection
- Project pipeline
- Regulatory & policy framework in place? Adequate?

![Diagram showing energy consumption and projections for 2014, 2025, and 2025+ with capacities such as 15 MW, 88 GWh/yr, and 100 GWh/yr.](image)
STEP 5: ISLAND RESOURCE ASSESSMENT

- R.E. generation potential (wind profile, space, environmental considerations etc.)
- Grid infrastructure
- Human capacity (expertise & knowhow)
A TECHNICAL R.E. ROADMAP

Grid Penetration of RE

- Starting Position
- Desired End Position

2015

0%

2020

2025

40%

30%

20%

10%

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AN ECONOMIC ROADMAP

- Starting Position
- Estimated End Position

Investment needed $, £, €
Strategic Question examples:
- Integration Renewables: Storage / Demand-side
- Grid-Upgrade requirements
- Compatibility existing system/investments
- Cost
- Reliability implications
STEP 6: SCENARIO DEVELOPMENT

INDICATIVE CAPEX (MM USD)

Gas (LPG)  Wind  Solar  Battery storage  Pumped Hydro storage

40% R.E.  50% R.E.  100% R.E.

Scenario 50% R.E.  Scenario 100% R.E. (met HFO backup)

% Share R.E.
STEP 7: PREFERRED SCENARIO SELECTION

Change
Production
Cost Price

+5 ct/kWh

0

-5 ct/kWh

10%

50%

100%

Scenario Gas

Scenario Sustainable

Scenario Business as Usual

+ 11

+ 4

+ 2

+ 65

Scenario 100% Sustainable

% Share R.E.

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STEP 8: IMPLEMENTATION STRATEGY

- Document roadmap principles in agreement (MoU, joint statement)
- Formalize partnership commitments
- Prepare an Integrated Resource Plan (IRP) which identifies detailed concrete projects and addresses any knowledge gaps identified in the road-map
- Assign clear leadership, roles and responsibilities to define and carry out the IRP, implement projects and coordinate among the stakeholders in order to implement the roadmap.
PROCESS SUMMARY

Project Phase 1

Energy Roadmap Scoping

- Current situation
- Business requirements & constraints
- Energy goals (EE, RE, alternative fuels)

Project Phase 2

Technical Modelling

- Load profile
- Current production plant
- Grid analysis

Economic Modelling

- Legacy cost base (OPEX)
- Investments (RE, Gas)
- Integration costs

Validation

Scenario Evaluation & Roadmap

- Scenario's for degree of gas or renewables that can be integrated into grid utilizing options as storage and automation to maintain grid stability
- Final roadmap (time line)
LESSONS, PITFALLS AND CHALLENGES

- Competing & vested interests (resistance to change)
- Disconnect between political ambition and practical (techno-economic) reality
- Unique challenges of small island energy systems
- Unclear roles and responsibilities resulting in lack of or unclear leadership or mandate
- Lack of clear policy/regulatory framework or gaps
- Limited in-house/local capacity to design and retrofit sustainable energy systems

Difficulties in the transition are in general less technology and more capacity, organisational and management driven.
DISCUSSION

✓ Discuss with your group where you are on this subject?
✓ What is going well and what challenges are you facing?
✓ What are areas where you would like to see technical assistance?
It's time for a break!
TOURISM HAS A GREAT IMPACT: SOCIAL, ECONOMIC, ENVIRONMENTAL POSITIVE AND NEGATIVE
IMPACT OF TOURISM

10% GDP
1/11 JOBS
US$ 1.5 trillion in exports
7% of world's exports
30% of services exports

WHY TOURISM MATTERS

©World Tourism Organization (UNWTO) 2016
SOCIAL IMPACTS

- Change or loss of indigenous identity and values
  - Culture clashes
  - Physical influences causing social stress
  - Ethical issues

- Revaluation of culture and traditions
- Employment creation, income redistribution (taxes)
  - Cultural Diversity
- Facilities developed for tourism can benefit residents
  - Tourism as a force for peace
SOCIAL IMPACTS

NEGATIVE

› Change or loss of indigenous identity and values
  › Loss of authenticity
  › Adaptation to tourist demands/ expectations
  › Standardization of the place (e.g. with well-known fast-food restaurants and hotel chains)

› Culture clashes
  › Economic inequality
  › Irritation due to tourist behavior
  › Job level friction

› Physical influences causing social stress
  › Depriving local people of access

› Ethical issues
  › Crime generation
  › Child labour
  › Prostitution and sex tourism

POSITIVE

› Revaluation of culture and traditions
  › Strengthening communities

› Employment creation, income redistribution and poverty alleviation through taxes
› Tourism encourages civil involvement and pride
› Cultural Diversity

› Facilities developed for tourism can benefit residents

› Tourism as a force for peace
ECONOMIC IMPACTS

- Leakage
- Enclave tourism
- Infrastructure cost
- Increase in prices
- Economic dependence on tourism
- Seasonal character of jobs

- Contribution to local economies
- Foreign exchange earnings
- Stimulation of infrastructure investment
- Contribution to government revenues
- Employment generation
## ECONOMIC IMPACTS

### NEGATIVE

- Leakage
  - Import leakage
  - Export leakage

- Enclave tourism (e.g. all-inclusive, cruise ship)

- Other negative impacts
  - Infrastructure cost
  - Increase in prices
  - Economic dependence of the local community on tourism
  - Seasonal character of jobs

### POSITIVE

- Contribution to local economies
- Foreign exchange earnings

- Stimulation of infrastructure investment
- Contribution to government revenues
- Employment generation
ENVIRONMENT IMPACTS

Depletion of Natural Resources
Pollution
Physical Impacts
Construction activities and infrastructure development
Deforestation and intensified or unsustainable use of land
Marina development

Financial contributions
Improved environmental management and planning
Environmental awareness raising
Protection and preservation
Alternative employment
Regulatory measures

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ENVIRONMENT IMPACTS

NEGATIVE

› Depletion of Natural Resources
  › Water resources
  › Land degradation

› Pollution
  › Air pollution and noise
  › Solid waste and littering
  › Sewage
  › Aesthetic Pollution

› Physical Impacts
  › Construction activities and infrastructure development
  › Deforestation and intensified or unsustainable use of land
  › Marina development
  › Alteration of ecosystems by tourist activities (anchoring, snorkeling, sport fishing)

POSITIVE

› Financial contributions
  › Direct financial contributions
  › Contributions to government revenues

› Improved environmental management and planning
› Environmental awareness raising
› Protection and preservation
› Alternative employment
› Regulatory measures
SUSTAINABLE TOURISM

"Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities“

(UNWTO http://sdt.unwto.org)
A balance must be established between these three dimensions for long-term sustainability.
How can you as the public sector promote Sustainable Tourism?
6 criteria’s for Sustainable Tourism:

1. Management
2. Nature & scenery
3. Environment & climate
4. Culture & heritage
5. Social well-being
6. Business
ROADMAPPING FOR SUSTAINABLE TOURISM

1. Management
2. Nature & scenery
3. Environment & climate
4. Culture & heritage
5. Social well-being
6. Business

1. Management
2. Nature & scenery
3. Environment & climate

4. Culture & heritage
5. Social well-being

6. Business
How can you as the public sector promote Sustainable Tourism?

1: Management

- Commitment & support of an organizational structure
  - Sustainability coordinator, a clear vision, involving public and private

- Tourism is carefully planned
  - Baseline assessment of impact, tourism policy and action plan to minimize impact

- Monitoring and reporting
  - Key indicators, review and evaluation, keeping records, public reporting

- Legal/ Ethical compliance
  - Codes, fair competition, guideline against corruption
How can you as the public sector promote Sustainable Tourism?

2: Nature and scenery

- Nature and conservation
  - Protection natural sites, habitats, wildlife protection, monitoring impact on nature

- Nature experience
  - Tourism is respectful to nature and supports its protection, minimizing use of animal use in tourism

- Landscape and scenery
  - Protection of scenic and rural views, minimizing landscape degradation
How can you as the public sector promote Sustainable Tourism?

3: Environment and Climate

- Landuse
  - Land use planning, coastal zone planning, maritime spatial planning

- Water management
  - Water quality, responsible resources management, minimizing usage, waste water treatment

- Waste & recycling
  - Solid waste reduction, waste separation, waste disposal safely and sustainable

- Energy
  - Reducing consumption, reduction use fossil fuels, reducing energy use for tourism mobility
How can you as the public sector promote Sustainable Tourism?
4: Culture and tradition

› Cultural heritage
  › Traditional architecture, cultural important landscapes, archaeological sites, local arts and craft

› People and tradition
  › Local life and culture, respecting the authenticity
How can you as the public sector promote Sustainable Tourism?

5: Social Well-Being

› Human respect
  › Property rights, indigenous rights, protection of people

› Community participation
  › Involvement in planning, inhabitant satisfaction, community empowerment

› Local economy
  › Private sector contribution, promoting local products, socio-economic development in community

› Social impact
  › Real estate exploitation, combat seasonality
How can you as the public sector promote Sustainable Tourism?

6: Business & Hospitality

- Business involvement
  - Sustainability standards to comply, certification, equal fair employment, corporate sustainability strategy

- Information and marketing
  - Respectful promotion, sustainability information, promotion as a green destination

- Hospitality and satisfaction
  - Visitor satisfaction feedback, survey, disabilities accessibility
2. Nature & scenery
3. Environment & climate

**WHAT**
- Protection and preservation
- Improved environmental management and planning
- Environmental awareness raising

**HOW**
- Financial contributions
- Protection and preservation
- Alternative employment
- Regulatory measures
ROADMAPPING FOR SUSTAINABLE TOURISM

PEOPLE

4. Culture & heritage

5. Social well-being

WHAT

› Do employees earn a living wage?
› Equal fair employment?
› Do we promote culture/ authenticity?

HOW

› Daily culture…
› Extraordinary events/
› Promotion of the country

SDG related to People (ST)
ROADMAPPING FOR SUSTAINABLE TOURISM

PROFIT

6. Business

WHAT
- Are we using resources efficiently?
- Do we promote local economy?
- Do we have a tourism management plan?

HOW
- Promotion of Green business: Eco-certification
- Promotion of PYMES/ artisans
- Management of seasonality, capacity…

SDG related to Profit (ST)
ROADMAPPING FOR SUSTAINABLE TOURISM

MANAGEMENT

› Strategy: Culture and Green destination
› Involve communities / local stakeholders
EXERCISE STEP 1

- Identify ST projects of your country.
  - Write current or past project of your country on a post-it
  - Categorize and stick these project under People/Planet/Profit.

- Identify imbalances
  - Do the projects benefit more than one category?
  - Which category is most covered with projects?
  - Which category is lacking attention?
BALANCING PEOPLE PLANET PROFIT

EXERCISE STEP 2

› Share your post-its in the columns:
  › Column People
  › Column Planet
  › Column Profit

› Get inspired by other countries. Identify inspiring initiatives to replicate.
EXERCISE STEP 3

- Identify goals
  - Which scenario do you want to reach?
  - What do you need to improve to reach your goals?
  - Where do you need to put more effort?

- Come with concrete projects to get the balance

- Get insight to develop a roadmap
CLOSING DISCUSSION & EVALUATION

PLEASE SHARE YOUR FINAL THOUGHTS...
THANK YOU FOR YOUR ATTENTION