
Certified Electrical Inspectors
Information Session
ELMAR
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Introduction

- **Introduction**
- Solar Projects
- DG Interconnection Agreement
- Policy & Procedures
- Tariff-structure
- ROI and financial analysis
- USB stick
- Questions and Discussions

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Introduction

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Solar Projects

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- ROI and financial analysis
- USB stick
- Questions and Discussions

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Solar Projects

- Solar Park Airport
- Solar Installation approved
- Solar Installation interested
- Solar installation non-approved

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Solar Projects

Solar Projects

Solar Projects

Solar Park @AAA

- 3.5MW
- 14,000 solar modules 250W
- 4x Central Inverters
- Surface 24,000m^2
- Yearly production estimated 6.5 million kWh
- In construction phase

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Solar Projects

Installation approved, 5 Sep 2013:

- 238kW

Installation interested:

- 582kW

Installation non-approved:

- 157.5kW based on 2.5kW

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DG Interconnection Agreement

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DG Interconnection Agreement

"DG Interconnection Agreement N.V. ELMAR"

As of September 2012

N.V. ELMAR is in the process of changing various articles of its Regulations. One of them is to allow interconnection of customer-owned generating facilities or Distributed Generation (DG) to the distribution system.

N.V. ELMAR has evaluated several DG interconnection philosophies and possibilities for introducing a policy that is both responsible and fair for both the Applicant and N.V. ELMAR. This new "DG Interconnection Agreement N.V. ELMAR" is an updated version of the prior "Basic Interconnection Requirements Policy N.V. ELMAR" issued in 2009. The "DG Interconnection Agreement N.V. ELMAR" covers the terms and conditions to start accepting requests higher than the prior 5kW limit and covers the introduction of a grid usage fee and a payback tariff for monthly surplus energy.

Technical aspects of the DG Interconnection Agreement will be the maximum DG capacity allowance for these DG-units. An impact study might be required to determine the maximum DG capacity allowance. This impact study is necessary to guarantee the integrity of the electrical distribution system. In addition to the 5kWp limit, N.V. ELMAR has increased the maximum installed capacity of DG-systems to 10kWp per domestic parcel and 100kWp per commercial parcel or institutions. The total kWp is determined by the sum of the capacity of each DG unit. In the case of Photovoltaic (PV) system, it is determined by the sum of the capacity of each solar module under standard test conditions (STC). This maximum DG capacitance allowance shall never exceed the parcel simultaneous capacity of the installation that has been checked and approved by the Department of Technical Inspections (DTI). To guarantee the quality of the distribution grid, N.V. ELMAR has the right to reject a request based on the impact analysis study. In the unlikely event that the DG installation starts behaving abnormally, N.V. ELMAR has the right to disconnect the system until it is repaired.

The Applicant needs to take into account that the DG-unit can only be interconnected with the electrical grid if the DG-unit can be automatically synchronized with N.V. ELMAR's 4 wire-system, three phase, 127V/220V, ± 4%, 60hz.

If the Applicant has a three phase unit, it will be interconnected to N.V. ELMAR's 4 wire system which includes, that the neutral wire (supplied by N.V. ELMAR) is not allowed under any circumstances to be connected to any installation ground.

If the Applicant has a single phase unit, a 2 wire system will be supplied with a neutral wire on which it is also not allowed to connect any installation ground.

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Siempre en sus clientes en mente

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DG Interconnection Agreement

- Before October 2012→5kW limit, No surplus arrangement
- Since October 2012
  - Grid Usage Fee (GUF) Awg 15,-/kW
  - 10kW Residential, 3kW GUF exempted, Awg 0.33235/kWh Monthly Surplus Tariff
  - 100kW Non-residential, Awg 0.2515 Monthly Surplus Tariff

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DG Interconnection Agreement

- The capacity (kWp) of the system is determine by the sum of the capacity of each solar module under standard test conditions (STC)
- This maximum DG capacitance allowance shall never exceed the parcel simultaneous capacity of the installation that has been checked and approved by the Department of Technical Inspections (DTI)

DG Interconnection Agreement

- The Applicant needs to take into account that the DG-unit can only be interconnected with the electrical grid if the DG-unit can be automatically synchronized with N.V. ELMAR's 4 wire-system, three phase, 127V/220V, ± 4%, 60hz

DG Interconnection Agreement

- The Applicant is **allowed to interconnect** and have a digital bi-directional DG meter installed **after** his/her DG-installation has **been** electrically **certified by DTI**

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DG Interconnection Agreement

"Its usually the ones who are willing to do anything or everything for others that end up getting hurt"

Sushan R Sharma

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Policy & Procedures

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Policy & Procedures

N.V. **ELMAR Solar Policy**

"Information about private production of solar energy"

Important requirements in the process of installing your solar installation

1. If the customer is interested in a solar panel he can send ELMAR an e-mail mentioning that he is planning to install a solar system, with all the available data, including at least:
   - The **address** where it will be installed, telephone number, and if available include an e-mail address as well.
   - The **power (kWp)** that one wishes to install and if there is more than one kWh-meter at the address one should indicate to which connection it will be interconnected. (A maximum of 10kW is allowed per domestic lot and 100kW per business lot). If there are two houses (two connections) on the same plot the 10kW will have to be divided among the two. For example 5kW per connection.
   - All information can be sent to solar@elmar.aw.
2. The customer who is interested in interconnecting will receive a draft Interconnection Agreement (a contract to interconnect) from ELMAR stating all the conditions under which one can interconnect. The interested party can read the conditions and decide whether to proceed with the plans. The benefits of interconnection will become effective after approval of the solar system and after signing the interconnection contract.
3. The customer who decided to get solar panels has to look for an electrician certified for this sort of work. The electrician shall submit a request with all the technical documents of the solar panels and the inverters at the Planning Department of ELMAR according to the application procedure that all electricians are aware of. The electrician must submit a site-plan, address and capacity of the solar panels to be installed. He must also submit proof of the current total capacity that was last inspected. Please take into account that when the Solar system is inspected DTI will also inspect the installation of the house or business. If parts of the installation have never been inspected before, these have to be inspected as well. It is not ELMAR's responsibility or of the other companies that sell solar panels that an installation has to be inspected. Take into account that any expenses due to the DTI inspection will be for the account of the customer.
4. The capacity of the solar system may not be larger than the capacity of the existing installation.
5. DTI will inspect the installation(s) in the presence of ELMAR. Official inspections are not in control of ELMAR. ELMAR's goal is to protect and safeguard its grid and the connection (cable, fuse box and meter).
6. When the inspection is being done the customer can decide to have the meter placed outside the yard at a spot approved by ELMAR. If the customer so decides he must have an adequate alcove (nis) for ELMAR to install the fuse box and the meter. A meter outside the yard is recommended but not obligatory. It is important to know that it is not possible to have the solar panels and a pre-paid meter on the same connection. If

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Bomper su nos clients den monte

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Policy & Procedures

N.V. ELMAR Solar Policy

"Information about private production of solar energy"

1) Notification Letter

- Address
- Type & Capacity
- Preliminary Approval

2) Info contract

- Draft (blank) Interconnection Agreement
- Policy
- "Keuring" is updated

3) Inspection process (keuring)

- Required documents
- Supply Preliminary approval

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Policy & Procedures

N.V. ELMAR Solar Policy

"Information about private production of solar energy"

4) Technical info

- The capacity of the solar system may not be larger than the capacity of the existing installation

5) Site Inspection

- DTI will inspect the installation(s) in the presence of ELMAR

6) Additional Info

- NIS
- Roof
- Black-Outs and Power Failures

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Policy & Procedures

N.V. ELMAR Solar Policy

"Information about private production of solar energy"

7) DG Interconn. Agreement

- The DG interconnection agreement will be signed after the approval of the site inspection

Additional info

- Regulations
- Bill
- Purchase (MST)

Policy & Procedures

(over) Voltage issues:

Voltage USA

- 120V (single phase)
- 208V(Three phase) or 240V (Split phase)

Aruba

- 127V/220V (Three phase)

Policy & Procedures

Equipment USA

- 120V +/- 10% (108V – 132V)
- 208V +/- 10% (187.2V – 228.8V)
- 240V +/- 10% (216V – 264V)

Aruba grid

- 127V +/- 4% (121.92V – 132.08V)
- 220V +/- 4% (211.2V – 228.8V)

Policy & Procedures

Lower Transform Tap:

Tariff-structure

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Tariff-structure

- Tariff Structure
- www.elmar.aw


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About Us
Rates
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bringing light 24 hours a day!
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Prepaid Meters
Welcome to N. V. ELMAR, the sole provider of electricity on the island of Aruba!
All 160 of us in the organization proudly serve our approximately thirty three thousand customers with dedication to excellent service.
Online Services
We are pleased to offer you the option to become a member, free of charge, of our online services. From your home or the office you can, 24 hours a day, 7 days a week, check the amount and due date of your current bill, access your billing and usage history and enter your meter reading. For more information click the link in the top left corner and have a bill on hand for a quicker enrollment.
Click here to view Elmar's Solar Panel Project
Click here to receive SMS notifications
Click here to understand your credit
Click here to understand your bill
Welcome!
"Our goal is to provide our customers with reliable power and to do this in a friendly and courteous manner."
Become a member of our online services and manage you energy account from any computer with Internet access. Make use of this option 24 hours a day, 7 days a week, to access your usage and billing and to submit your meter reading. To learn more about this free service click here.


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bringing light 24 hours a day!
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Customer Service
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Report Trouble
Start Saving
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Rates :: Rate A :: Rate B :: Rate C :: Rate DB
Our Rates
Elmar has 4 general electric rates, depending on the need of the customer, to calculate one's electric bill: Rate A, B, C, and DB.
The Aruban currency is designated in florins written Afl. The bank rate of exchange is fixed at Afl. 1.77 to one U.S. dollar but Elmar converts it to Afl.1.75.

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Rate A (Residential Rate)

Residential rates are only applicable for household usage; lighting, ventilators, cooking appliances, refrigerators, vacuum cleaners, radios, televisions, air conditioning units, etc.

Character of Service: Alternating current, three phase, 60 hertz. Use of power is permitted for the entire day (24 hours) unless otherwise specified. The supplied electricity goes through a meter that registers the usage in kilowatt-hours (kWh). The customer will be charged a monthly fixed fee of AWG 10,- and also a price per kWh usage according to the table below. The consumption period is the cycle of approximately 30 days between two meter readings.

To see how to read your meter, visit our Your Meter page. To calculate additional sample bill amounts, enter the kWh usage below and press the calculate button.

Enter kWh usage 220 Calculate

Calculation as of November 2012	Price/kWh	kWh	Sub-Total
Flat Rate			10.00
Energy Charge: First 500 kWh	0.391	220	86.02
Energy Charge: 501-1000 kWh	0.449	0	0.00
Energy Charge: Over 1000 kWh	0.584	0	0.00
Total Electric Bill - Rate A			96.02

Calculation before November 2012	Price/kWh	kWh	Sub-Total
Energy Charge: First 250 kWh	0.1850	220	40.70
Energy Charge: 251-500 kWh	0.1450	0	0.00
Energy Charge: Over 500 kWh	0.1400	0	0.00
Fuel Surcharge: All kWh	0.3847	220	84.63
Credit: Up to 500 kWh	0.0598	220	-13.16
Total Electric Bill - Rate A			112.17

The example calculation excludes stamp tax (Afl.00.10) and the amount of deposit which varies per customer. Please contact Customer Service for details.

Tariff-structure

Calculation as of November 2012	Price/kWh	kWh	Sub-Total
Flat Rate			10.00
Energy Charge: First 500 kWh	0.391	220	86.02
Energy Charge: 501-1000 kWh	0.449	0	0.00
Energy Charge: Over 1000 kWh	0.584	0	0.00
Total Electric Bill - Rate A			96.02

Calculation before November 2012	Price/kWh	kWh	Sub-Total

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Rate B (Commercial Rate)

Commercial rates are only applicable for commercial usage such as offices, stores, hotels, restaurants, pubs, etc. where the customer's installed capacity is less than 500 kVA.

Character of Service: Alternating current, three phase, 60 hertz. Use of power is permitted for the entire day (24 hours) unless otherwise specified. The supplied electricity goes through a meter that registers the usage in kilowatt-hours (kWh). The customer will be charged a monthly amount of AWG 50,- and also a price per kWh usage according to the table below. The consumption period is the cycle of approximately 30 days between two meter readings.

To see how to read your meter, visit our Your Meter page. To calculate additional sample bill amounts, enter the kWh usage below and press the calculate button.

Enter kWh usage 8000 Calculate

Calculation as of November 2012	Price/kWh	kWh	Sub-Total
Flat Rate			50.00
Energy Charge: All kWh	0.503	8000	4024.00
Total Electric Bill - Rate B			4074.00

Calculation before November 2012	Price/kWh	kWh	Sub-Total
Energy Charge: First 250 kWh	0.1850	250	46.25
Energy Charge: 251-10000 kWh	0.1750	7750	1356.25
Energy Charge: 10001-20000 kWh	0.1650	0	0.00
Energy Charge: Over 20000 kWh	0.1500	0	0.00
Fuel Surcharge: All kWh	0.3847	8000	3077.60
Total Electric Bill - Rate B			4480.10

The example calculation excludes stamp tax (Afl.00.10) and the amount of deposit which varies per customer. Please contact Customer Service for details.

ROI and financial analysis

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ROI and financial analysis

Facts & estimations:

- Standard solar module 60 cell, approx 250Wp
- Standard size: 1m x 1.6m (area 1.6m^2)
- 1kW = 4x 250Wp
- 1kW = 6.4m^2 (4x 1.6m^2)
- PSH (Peak Sun Hours) in Aruba: 5hrs (yearly avg)
- Production per day, per kW: 5kWh
- Production per year, per kW: 1825kWh

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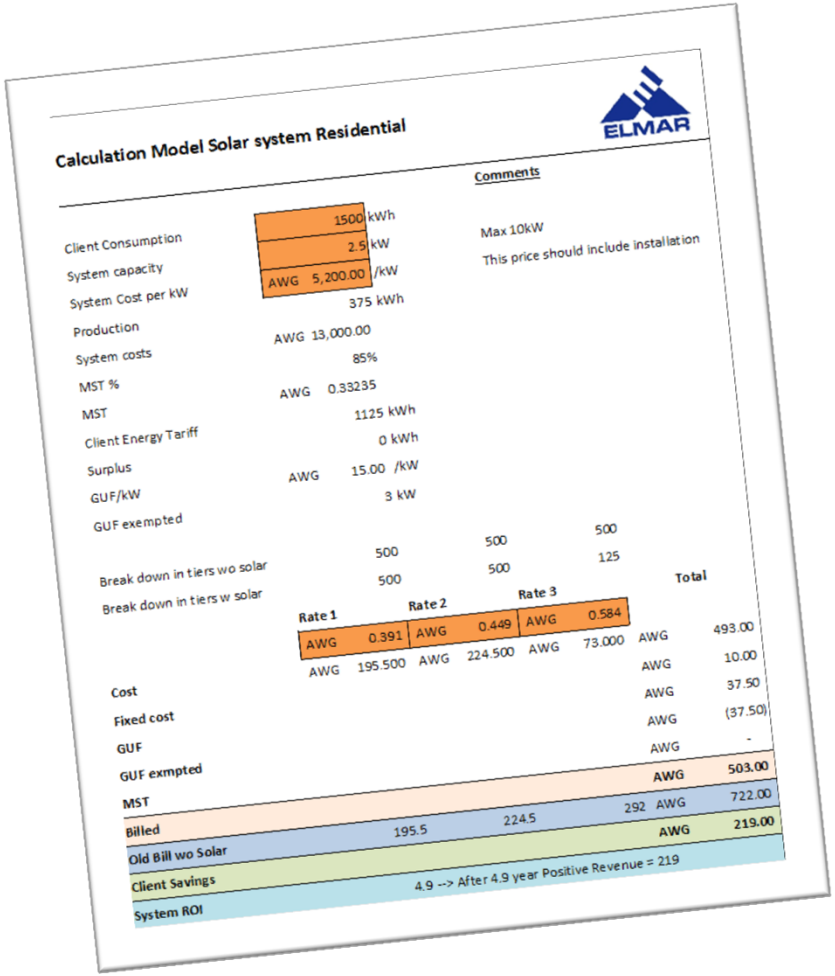
ROI and financial analysis

Excel Model:



Calculation Model Solar system Residential

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			Comments
Client Consumption	1500	kWh	Max 10kW
System capacity	2.5	kW	This price should include installation
System Cost per kW	AWG 5,200.00	/kW	
Production	375	kWh	
System costs	AWG 13,000.00		
MST %	85%		
MST	AWG 0.33235		
Client Energy Tariff	1125	kWh	
Surplus	0	kWh	
GUF/kW	AWG 15.00	/kW	
GUF exempted	3	kW	

Break down in tiers wo solar	500		500		500		
Break down in tiers w solar	500		500		125		
	Rate 1		Rate 2		Rate 3		Total
	AWG 0.391		AWG 0.449		AWG 0.584		
	AWG 195.500		AWG 224.500		AWG 73.000	AWG	493.00
Cost						AWG	10.00
Fixed cost						AWG	37.50
GUF						AWG	(37.50)
GUF exmpted						AWG	-
MST						**AWG**	**503.00**
Billed						292 AWG	722.00
Old Bill wo Solar	195.5		224.5			**AWG**	**219.00**
Client Savings							
System ROI	4.9 --> After 4.9 year Positive Revenue = 219						

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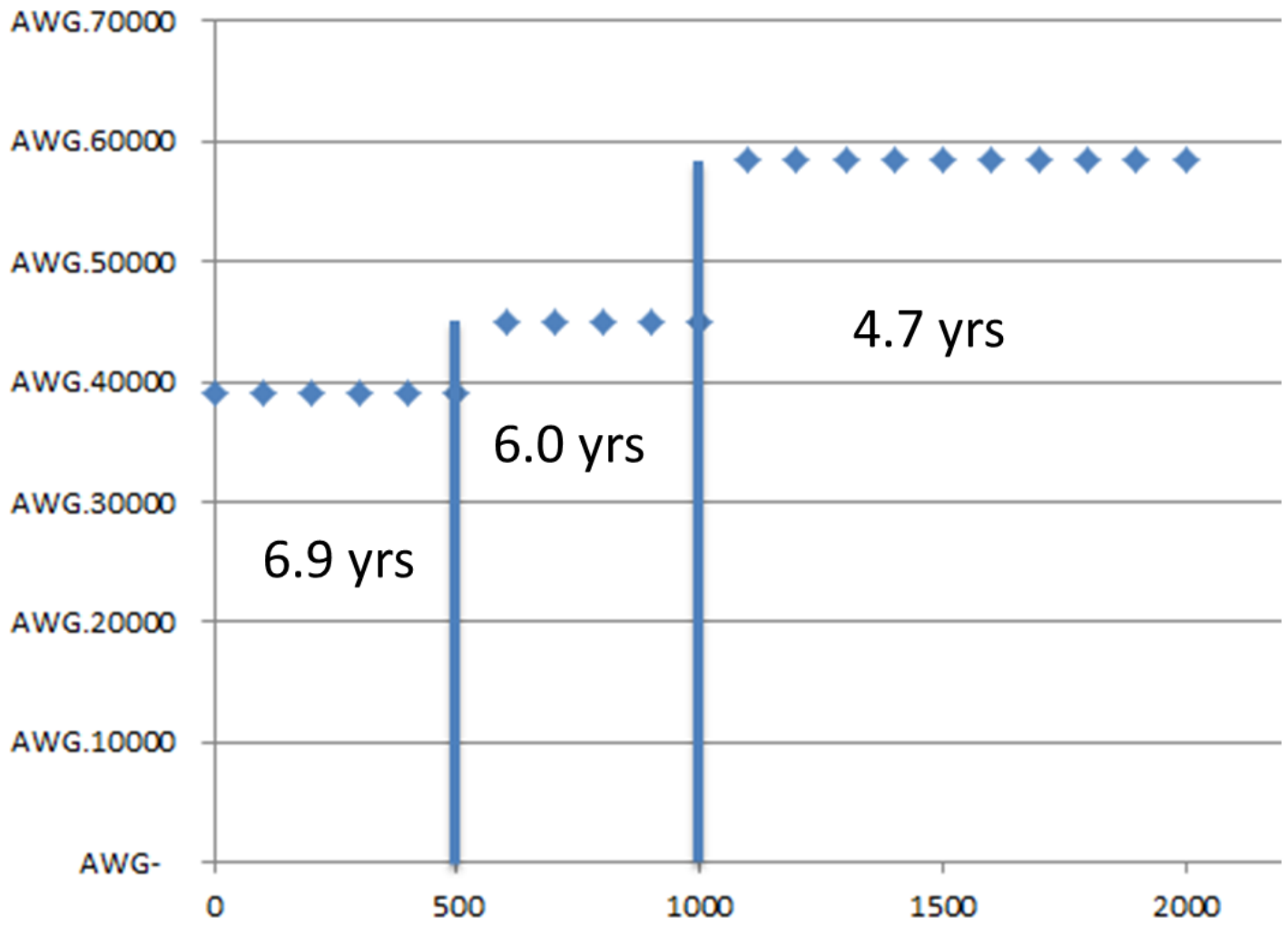
	A	B	C	D	E
2				**Comments**	
3	Client Consumption	1500	kWh		
4	System capacity	2.5	kW	Max 10kW	
5	System Cost per kW	AWG 5,200.00	/kW	This price should include installation	
6	Production	375	kWh		
7	System costs	AWG 13,000.00			
8	MST %	85%			
9	MST	AWG 0.33235			
10	Client Energy Tariff	1125	kWh		
11	Surplus	0	kWh		
12	GUF/kW	AWG 15.00	/kW		
13	GUF exempted	3	kW		
14					
15	Break down in tiers wo solar	500	500	500	
16	Break down in tiers w solar	500	500	125	
17		**Rate 1**	**Rate 2**	**Rate 3**	**Total**
18		AWG 0.391	AWG 0.449	AWG 0.584	
19	**Cost**	AWG 195.500	AWG 224.500	AWG 73.000	AWG 493.00
20	**Fixed cost**				AWG 10.00
21	**GUF**				AWG 37.50
22	**GUF exmpted**				AWG (37.50)
23	**MST**				AWG -
24	**Billed**				**AWG 503.00**
25	**Old Bill wo Solar**	195.5	224.5	292	AWG 722.00
26	**Client Savings**				**AWG 219.00**
27	**System ROI**	4.9 --> After 4.9 year Positive Revenue = 219			

	A	B	C	D	E
2				**Comments**	
3	Client Consumption	500	kWh		
4	System capacity	9.9	kW	Max 10kW	
5	System Cost per kW	AWG 5,200.00	/kW	This price should include installation	
6	Production	1485	kWh		
7	System costs	AWG 51,480.00			
8	MST %	85%			
9	MST	AWG 0.33235			
10	Client Energy Tariff	0	kWh		
11	Surplus	985	kWh		
12	GUF/kW	AWG 15.00	/kW		
13	GUF exempted	3	kW		
14					
15	Break down in tiers wo solar	500	0	0	
16	Break down in tiers w solar	0	0	0	
17		**Rate 1**	**Rate 2**	**Rate 3**	**Total**
18		AWG 0.391	AWG 0.449	AWG 0.584	
19	**Cost**	AWG -	AWG -	AWG -	AWG -
20	**Fixed cost**				AWG 10.00
21	**GUF**				AWG 148.50
22	**GUF exmpted**				AWG (45.00)
23	**MST**				AWG (327.36)
24	**Billed**				**AWG (213.86)**
25	**Old Bill wo Solar**	195.5	0	0	AWG 205.50
26	**Client Savings**				**AWG 419.36**
27	**System ROI**	10.2 --> After 10.2 year Positive Revenue = 419.36			

ROI and financial analysis



USB stick

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USB stick

Files on the USB stick:

- DG Interconnection Agreement
- Policy & Procedures
- Presentation
- ROI and financial analysis Excel spreadsheets
- DTI-files
- Lijst van Erkende Installateurs

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Questions and Discussions

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Thank You
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