

# AN OVERVIEW OF RENEWABLE ENERGY IN THE WORLD, THE CARIBBEAN AND CURAÇAO

Dutch Caribbean Economists

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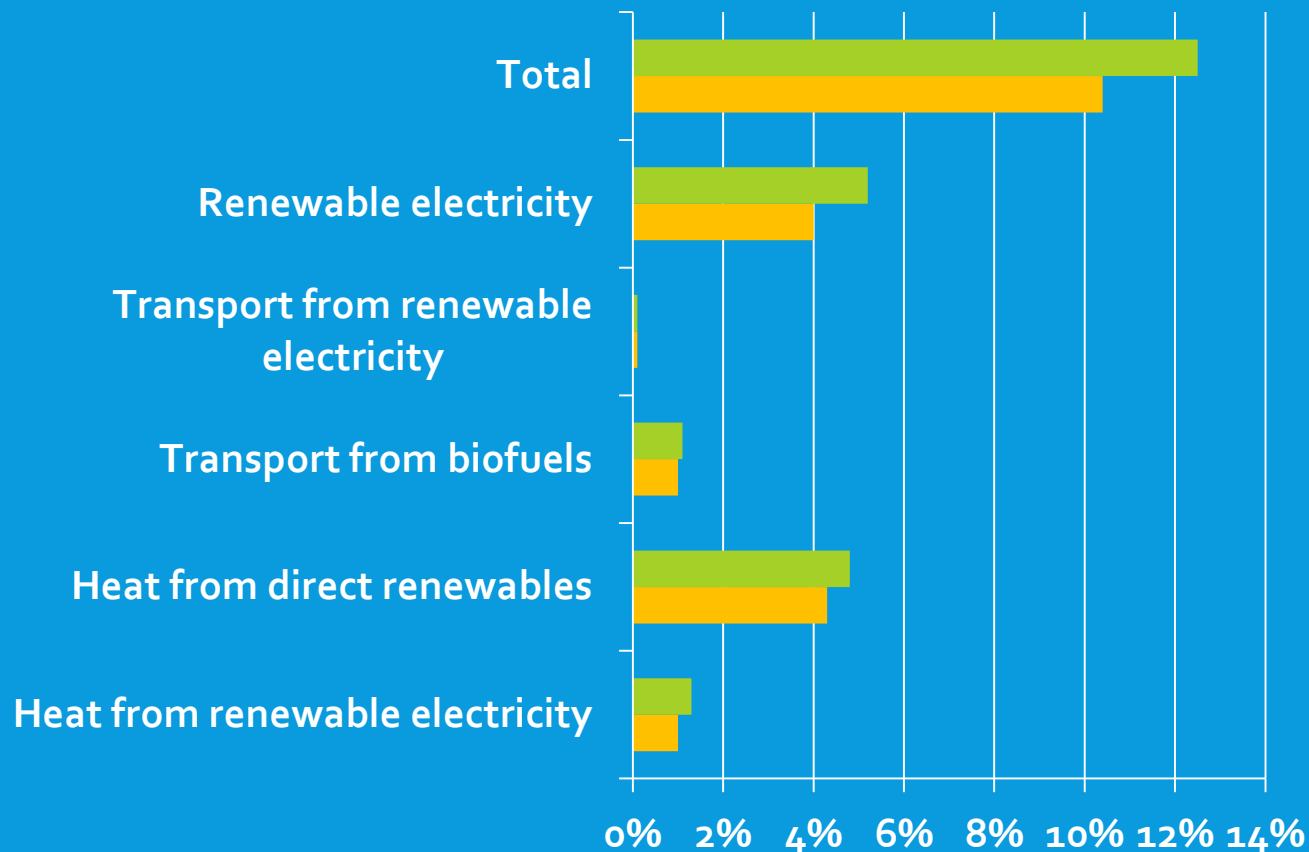
# TOPICS: RENEWABLE ENERGY

- The world
- Small Caribbean States and other Small States
- Curaçao
- Curaçao target in the Energy Policy
- Economic and foreign exchange impact

# TOTAL SHARE OF WORLD RENEWABLES FORECASTED TO REACH 12% OF TOTAL IN 2023



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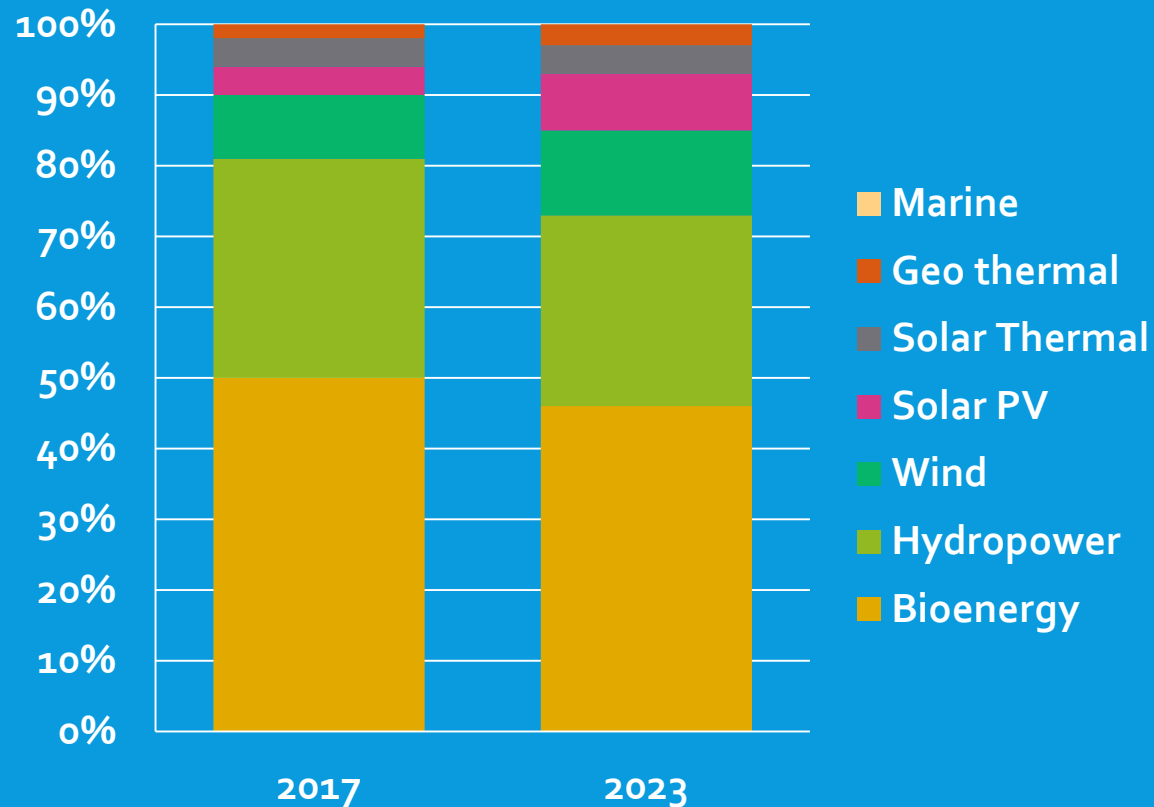
- Transport mostly from biofuels
- 'Heat' is an important use of energy
- Perhaps in Curacao 'heat' should be replaced with 'air cooling'

# SOLAR PV TO REMAIN SMALL PERCENTAGE OF TOTAL RENEWABLE ENERGY



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Type of renewable as share of total renewable energy



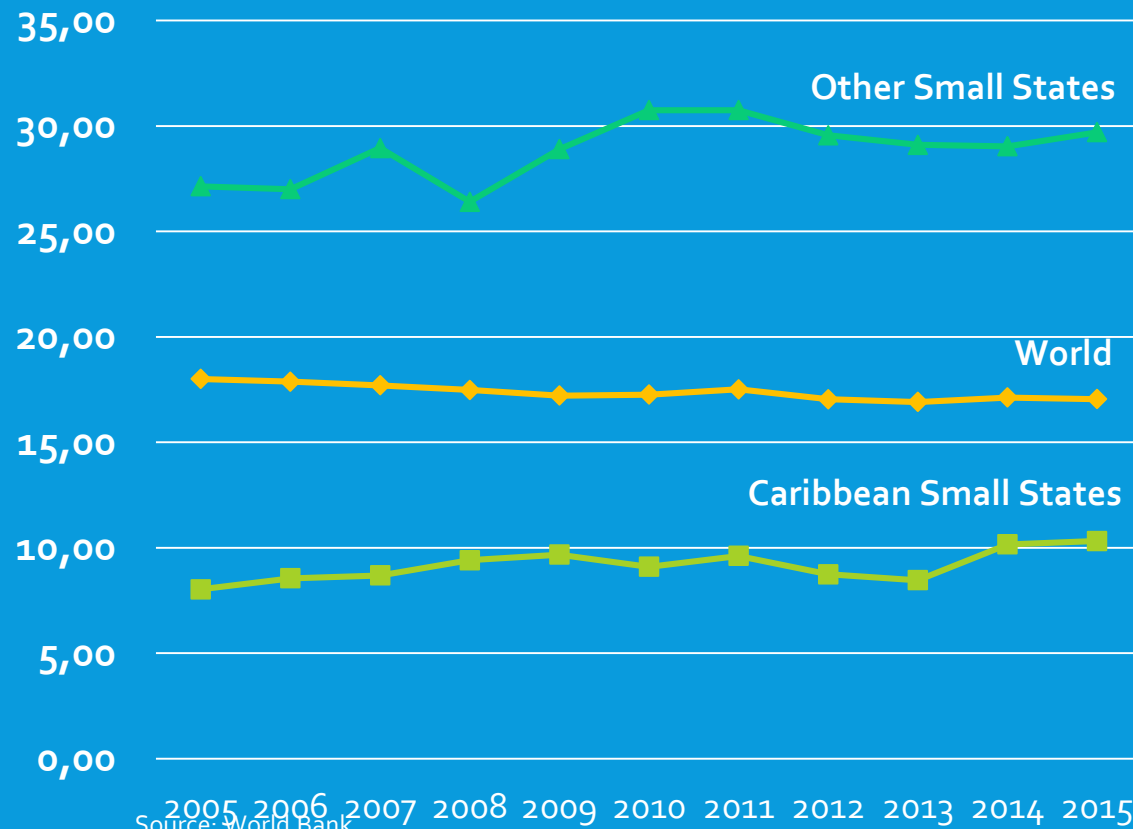
- Bioenergy (biofuel) is most important
  - Made from living organisms: plant or manure, waste or intentionally planted (ethanol). Sargassum may be an alternative
- Solar PV only 4% of total in 2017
- Solar PV expected to double to 8% in 2023

# THE CARIBBEAN FALLS BEHIND, BUT NOT CURAÇAO...



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Renewable energy consumption as percentage of total energy consumption



- Caribbean small states fall behind world average in renewable energy consumption
- Other small states lead world in renewable energy consumption
  - They do 3x as much as Caribbean small states
- Curaçao does too
- Curaçao can 'sell' its knowledge to Caribbean small states

Source: World Bank

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# CURAÇAO WIND AND SOLAR PV CAPACITY: EST. 30% OF PEAK DEMAND



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Wind capacity: 23% of avg. peak demand

Solar PV: 7% of avg. peak demand

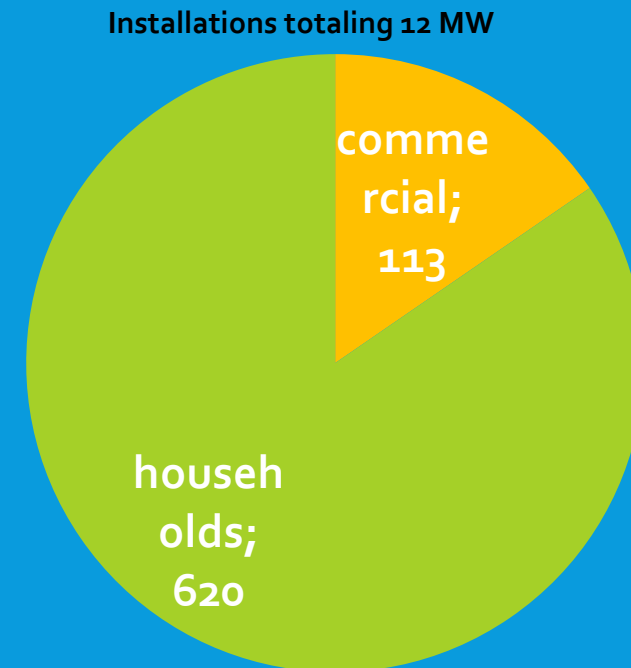
**Kapasidat i demanda di koriente proyektá**

AQUALECTRA

SIMAN 21 | 20 mei 2019 - 27 mei 2019

Lugá	20/5	21/5	22/5	23/5	24/5	25/5	26/5	27/5
Dokweg	30.3	30.3	30.3	26.0	26.0	26.0	31.8	31.8
Dokweg II	26.7	36.5	36.5	45.4	45.4	55.1	55.1	46.2
Dokweg III	0	0	0	0	0	0	0	0
MAN Diesel Plant Isla	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Parke di Mulina	35.0	32.0	30.0	26.0	26.0	20.0	20.0	20.0
Gasturbine Mundo Nobo	0	0	0	0	0	0	0	0
CRU	0	0	0	0	0	0	0	0
Aggreko	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
<b>Total na kapasidat*</b>	<b>117.8</b>	<b>124.6</b>	<b>122.6</b>	<b>123.2</b>	<b>123.2</b>	<b>126.9</b>	<b>132.7</b>	<b>123.8</b>
<b>Demanda momentu pik</b>	<b>114.5</b>	<b>113.8</b>	<b>112.4</b>	<b>113.1</b>	<b>115.0</b>	<b>108.8</b>	<b>108.5</b>	<b>114.5</b>

Tur unidat ta MW.

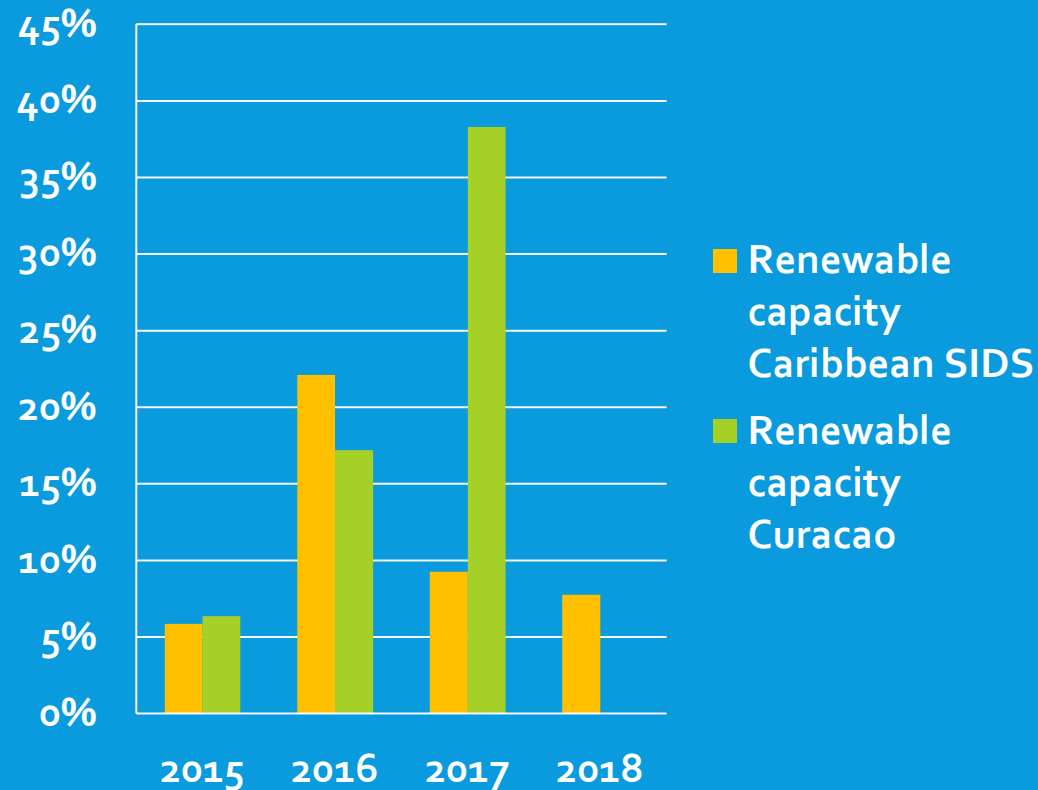


Source: Author's calculations based on Aqualectra and BTP  
Installed is not the same as capacity. There is more wind installed than the capacity shown here. Peak demand: 114 + 12 = 126MW

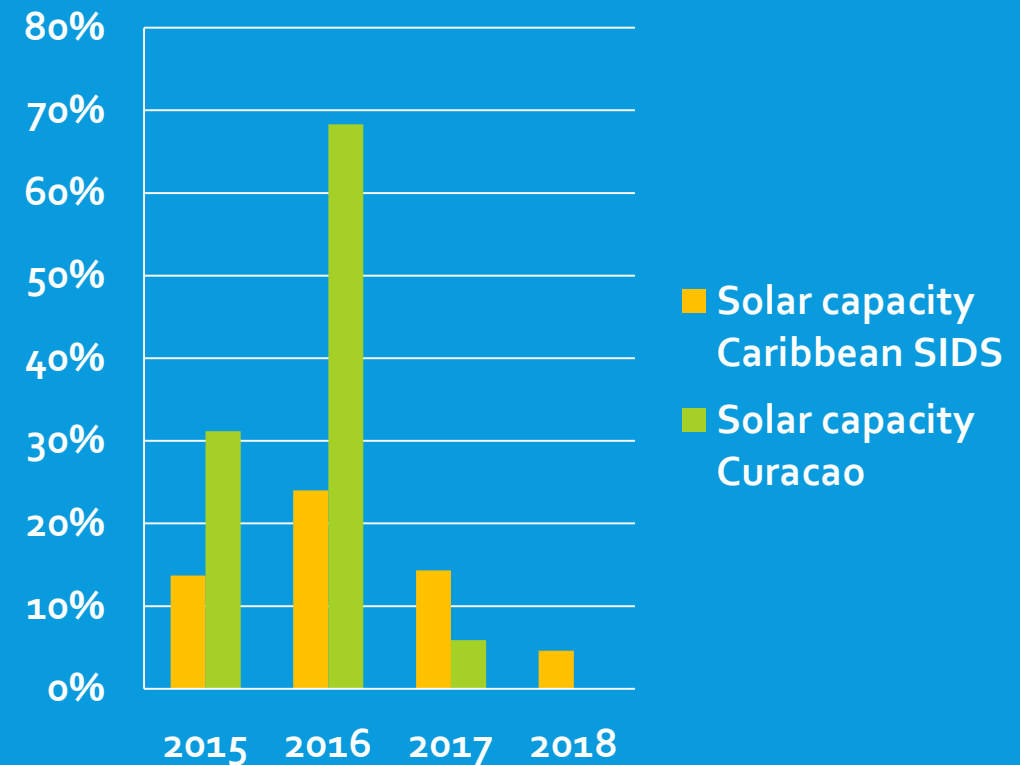


# BUT CURAÇAO MUST KEEP GOING!

## Growth in Renewable Capacity



## Growth in Solar Capacity





# TARGET: 50% RENEWABLES BY 2035

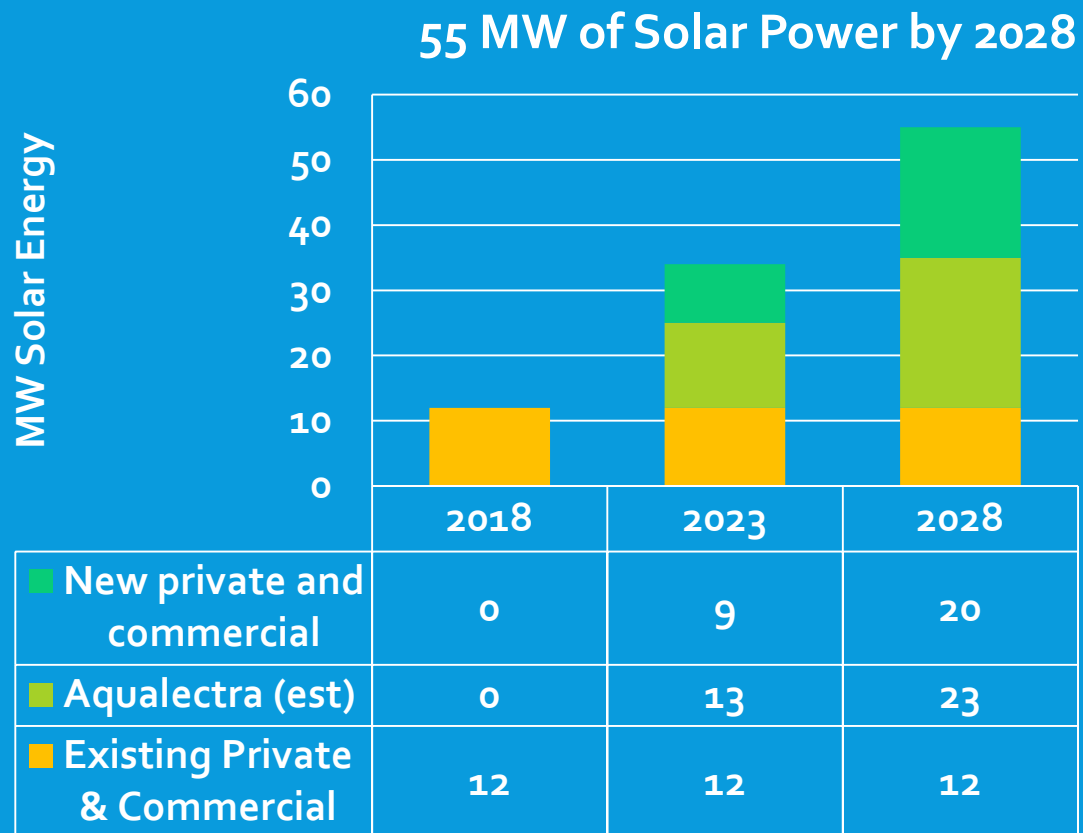
Type	Target amount	Target Date
Wind	65 MW	2025
Solar	55 MW	2028
Waste-to-Energy	7.5 MW	2021

- Private parties may also produce 'for sale'
- Opportunities for innovation, import, installation, maintenance, repair, financing





# CURACAO TARGET: 55 MW SOLAR PV POWER BY 2028

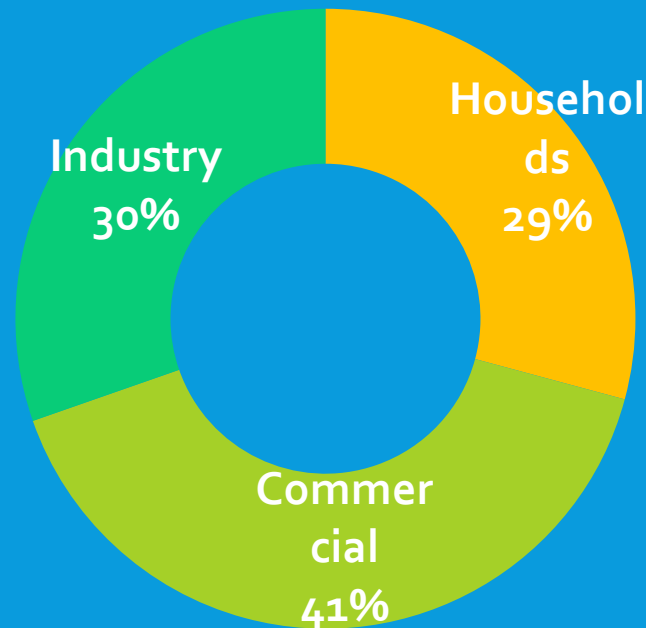


- Much room for private installations
- For ALL: from the very small to the very large
- Government to incentivize
- Energy policy (2017): 'lack of installers, lack of space, lack of incentives'
- Much room for SME to install and maintain
- Excellent opportunity for 'technical people' losing their jobs at the refinery



# TARGET: 25% LESS DEMAND BY 2040

## Curaçao Electricity Demand 2017: 692 GWH



- Challenge for households, industry and commercial enterprises to replace appliances and equipment with more energy efficient ones
- Much room for SME to sell more energy efficient appliances
- Need for energy audits, energy efficient buildings, etc.

# IMPACT ON GDP AND FOREIGN EXCHANGE



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	<i>Barrels (millions)</i>	<i>In ANG millions (USD 65/barrel)</i>	<i>Direct impact per annum based on 2018 GDP</i>
Usage in barrel equivalents	6.6	785	-14.03%
<b>2018:</b> 30% savings on fuel import due to renewables	2	238	+4.25%
<b>2023:</b> 40% savings on fuel import due to renewables	2.65	315	+5.63%
<b>2028:</b> 50% savings on fuel import due to renewables	3.3	393	+7.01%
<b>2040:</b> 25% savings on fuel import due to efficiency improvements	1.65	196	+3.51%

## Ban p'e!

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## JUNE 5 AT AVILA HOTEL

- MarkStra Caribbean advises private enterprise and governments on competitiveness and sustainable strategic growth
- Often on behalf of multilateral agencies
- Energy is fundamental to competitiveness and sustainability
- Focus is on the Caribbean Small Independent Developing States (SIDS)
- Sustainable Development Goals and Paris Accord are key
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