



Customer Sited Solar PV & The Impact of Grid Interactive Systems



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Solar Photovoltaic

- Anguilla bathed in power every day
- 6 KWh per sq. meter per day (6 full sun hours)
- Sun comes out every day
- Anguilla has sparse cloud cover, no mountains
- Solar is complimentary with large wind projects
- Solar PV generally does not require planning permission
- 25 year life and beyond



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Solar PV



Virtually no Solar PV Systems currently installed because of current regulatory status



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Our Energy

Why does a country with near the highest level of sun in the world import oil at unstable prices?

Why does a country with near the highest level of sun in the world exclusively burn fossil fuels and contribute to climate change

The sun is shining, the wind is blowing, yet we burn diesel to make electricity



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Our Energy

Generating electricity from oil to meet Anguilla's needs releases ~60,000 Metric Tonnes of CO² into the atmosphere each year



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Sustainability

- Demand for energy will be increasing by 50% in 20 years and there is no way to meet this amount with non-renewable nuclear or fossil sources
- The world is depleting the fossil fuel reserves at a rapid rate
- At some point oil will be hard to get
- As oil demands grows, we will be more dependant



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Sustainability

...while current energy production relies heavily on the use of fossil fuels, available supply is constantly decreasing.

Anglec 2008 Annual Report



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Sustainability

“The flow rates from the existing projects are the key. Capacity coming on stream falls fast beyond 2011.

On top of that, if the big old fields begin collapsing, the descent in supply will hit the world very hard.”

Jeremy Leggett, author of Half Gone



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Sustainability

“Drill, Baby, Drill”

Even an enormous increase of drilling effort is unlikely to lead to significantly increased oil and gas production in a mature petroleum region like the United States.

2008 Journal of Energy Security

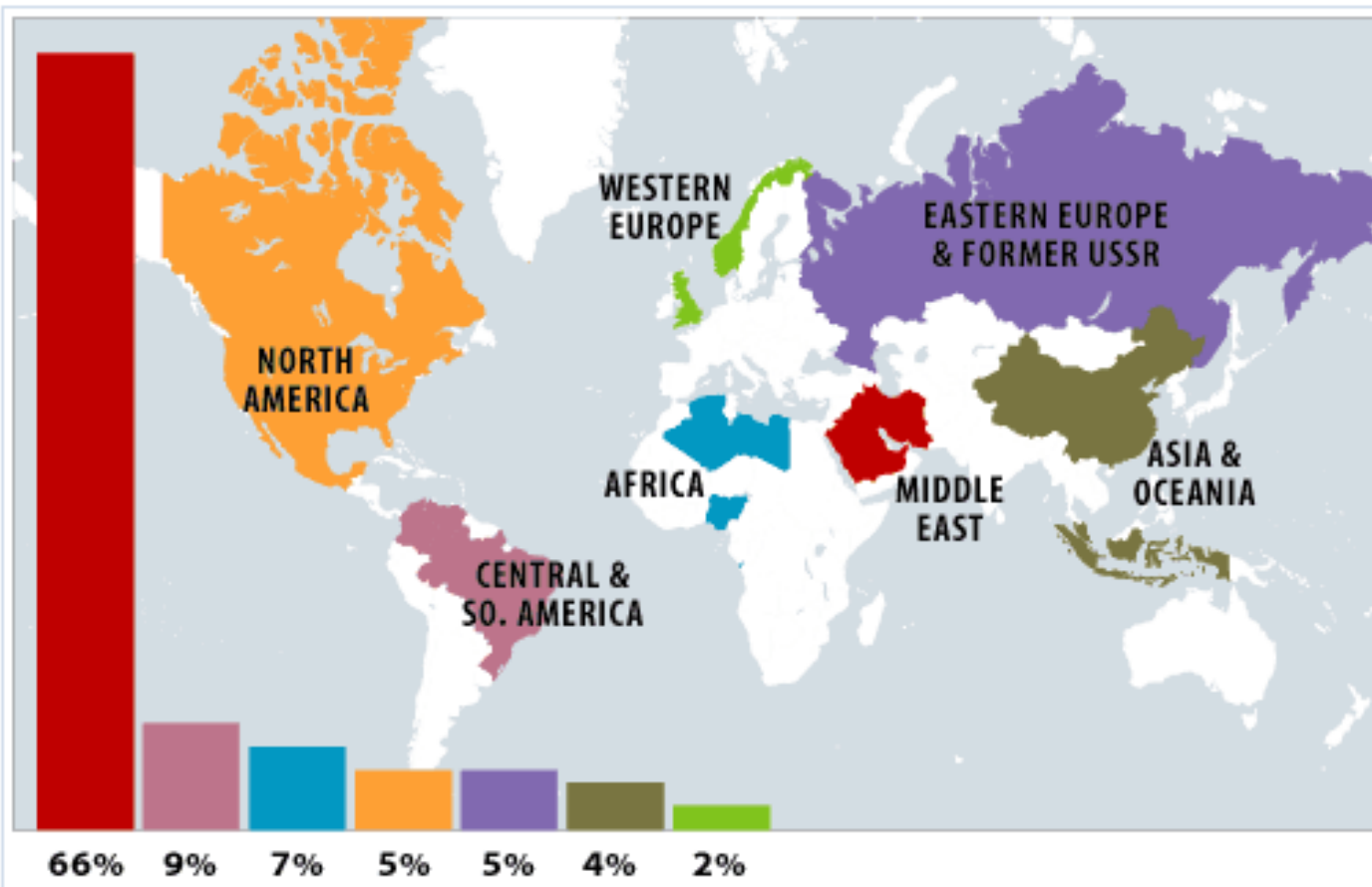


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Where Are the World's Oil Reserves?



Economics

Solar PV is an Investment Opportunity

Average Anguillian Home Owner can finance

- expensive vehicle and lose 30% per annum or...
- Solar PV system and get return for 25 years



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Incentives

- With electricity at 33c there is sufficient incentive to install solar
- Oil prices likely to go higher over time
- Return on Investment break even as short as 5 years
- Life of system beyond 25 years
- No cost to Government
- Great PR for Government



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Energy Management

- Utility promoting conservation and reduced demand
- Current emphasis on reducing demand by conservation
- Home Owners want to do more than change a few light bulbs
- Residential Solar PV should be viewed as a part of this program
- Installing Residential Solar PV is just another way for a home owner to reduce demand



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Grid Tie

What is meant by Grid-Tie?

- Solar PV system uses Inverter to generate 120V/240V electricity
- Output connected to house panel
- House uses power, balance flows to grid
- House needs more power than system is providing (night, cloud), draws power from the grid.
- Allows for partial load systems



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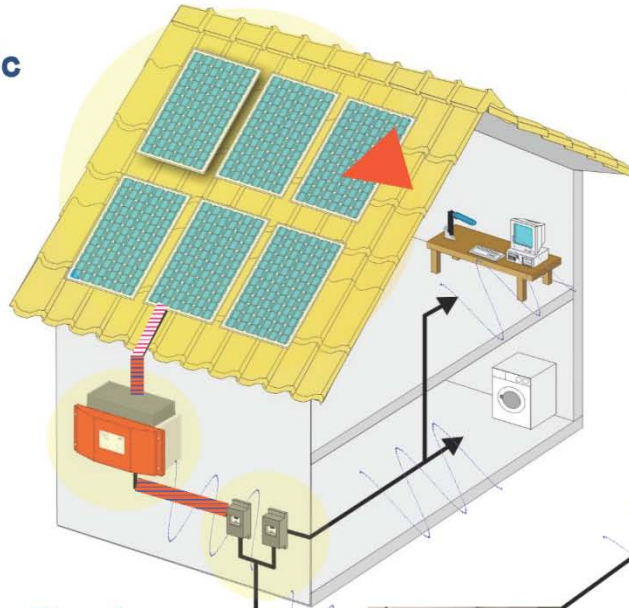


**Photovoltaic
Array**



Grid Tie PV System

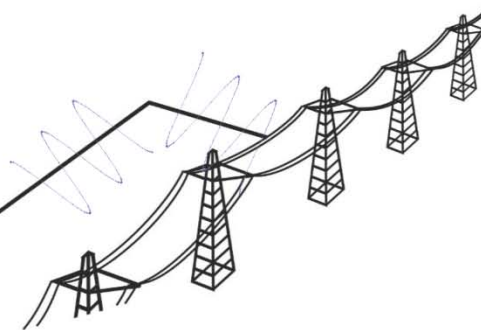
**SMA
Sunny Boy
Inverter**



**Breaker
Boxes**



Meter



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Grid Tie

- Typical residential system size is 3-5 kW
- Grid-tie represents 90% of Solar PV market.
- Simple system: modules, mounting rack, & inverter
- ***Will not produce power when grid is down***
 - Due to system safety considerations
 - Tremendous research and engineering



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Why is Grid Tie important?



Without Grid-Tie, the only option is batteries

- Battery system requires ability to service peak demand
- Batteries are expensive and have short life
- Batteries are toxic and add to pollution problems
- Anguilla has no battery disposal, batteries end up in landfill
- Electrolyte spills into ground polluting ground water with lead



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Why is Grid Tie important?

- Customer Sited Solar PV is not viable without Grid-Tie
- Virtually NO solar PV has been installed in Anguilla because of this
- Allowing Grid-Tie encourages investment in Renewable Energy
- Allows the average Anguillian to invest in themselves in stages
- Allows home and business owners to hedge against fluctuations



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Safety Issues



- Inverters will shut down output within 20ms on loss of grid
- All Grid-Interactive Inverters must be UL rated to UL 1741
- All Grid Interactive systems must meet NEC Article 690 Solar PV Systems
- NEC is Anguilla's governing code book
- Grid-Tie in use in every major country in the world
- Grid-Tie in use in many Caribbean countries
 - Barbados
 - Grenada
 - Jamaica
 - USVI



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Safety Issues

- Grid Interactive Inverter does not put out power during power outage,
- It is not a backup system
- No danger to linesmen, home owner
- Strict safety standards – UL 1741, IEE 1574
- In use successfully all over the world

The Key to Safety is Standards



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Safety Issues



- Quality installation work is essential, both to ensure safety and customer satisfaction
- High installation standards help to promote Anguilla as exporter of technology
- Installers can be required to have NABCEP certification, Industry standard Certified Energy Practitioners



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Precedence

- 25 years ago, the customer could not buy a fax machine and connect it to the phone system
- Customer needed permission to connect devices
- Customer forced to buy equipment from Utility at inflated rates
- Utility had monopoly on providing service
- Costs very high, no incentive for innovation
- Utility protected that monopoly fiercely
- Everything changed and the world did not end



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Economic Benefits

- The economic efficiency of a country is dependent on its energy efficiency
- Buying oil is not sustainable and saps cash
- Country is very vulnerable to oil price fluctuations
- Solar PV allows home and business owners to hedge against fluctuations
- 20% Solar PV means 20% less price change.
- Large oil price change could bankrupt Anguilla
- Allows Anguillians to invest in their own future
- Reduces imports of oil
- Opportunity to export technology



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Large Scale Projects

- Despite enlightened policy, still no installed capacity
- Lack of financing for Renewable Energy project in the region
- Grant proposals and donor funding often hinge on demonstrable commitment
- Grid-Tie/NetMetering demonstrates commitment to RE without cost to GOA
- Small scale projects develop expertise



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Conclusion

- Solar PV can contribute now!
- Grid Tie is the pivotal action to begin implementation of the NEP
- Enabling Solar PV projects enables National Energy Policy
- No cost to Government
- Public/Private Partnership
- Safe reliable power from our own resources
- Jobs and Exports for Anguilla
- Good Investment for average Anguillian
- Great PR!



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