Nicaragua 12 MW Biomass Power Plant with Dedicated Energy Crop Plantation

VIASPACE Clean Energy for a Cleaner Tomorrow

Giant King Grass

Dr. Carl Kukkonen
CEO VIASPACE Inc., USA
kukkonen@viaspace.com
www.viaspace.com

International Biomass Conference
Orlando Florida March 24-26 2014

- VIASPACE is a publicly traded company on the US OTC Bulletin Board
  - VIASPACE stock symbol VSPC.OB

Safe Harbor Statement: Information in this presentation includes forward-looking statements which relate to future events or performance, and involve known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to be materially different from those expressed or implied by these forward-looking statements. Such factors include, without limitation, risks outlined in our periodic filings with the U.S. Securities and Exchange Commission, including Annual Report on Form 10-K for the year ended December 31, 2011, as well as general economic and business conditions; and other factors over which VIASPACE has little or no control.

Dr. Carl Kukkonen
CEO Biography

VIASPACE Clean Energy for a Cleaner Tomorrow

1998-PRESENT VIASPACE Inc. CEO—Originally products "VIA" the "SPACE" program

1984-1998 NASA/Caltech Jet Propulsion Laboratory (JPL)

Director Center for Space Microelectronics Technology & Manager of Supercomputing

- **Led staff of 250 with $70 million annual budget**
- **On review boards of 14 leading universities**
- **NASA Exceptional Achievement Award 1992**
- **Space Technology Hall of Fame 2001**

1977-1984 Ford Motor Company

- **Developed direct injection diesel engine**
- **Ford's expert on hydrogen as an automotive fuel**
- **Research in Physics Department**

1975-1977 Purdue University postdoctoral fellow

1968-1975 Cornell University MS & PhD in theoretical physics

1966-1968 University of California Davis BS physics

Nicaragua

VIASPACE Clean Energy for a Cleaner Tomorrow

- Largest country in Central America (in area)
- 5M people, 6M cows
- Safest country in region
  - Peaceful, civil war well in past
- Poor, but no misery
- Tropical climate
  - Rainy & dry seasons
- Bunker oil is base for electricity
  - Hydro for rainy season
  - Wind, but no solar

Nicaragua

VIASPACE Clean Energy for a Cleaner Tomorrow

- Policy is green electricity with lower cost than oil
- But hydro is seasonal and wind intermittent
  - Grid cannot handle any more intermittent
- No incentives except 7 year tax break
- Nicaragua has low labor costs and industry wants to move there
  - But needs reliable electricity
- Can sell electricity to grid and private industry delivered by grid

AGRICORP is Partner

VIASPACE Clean Energy for a Cleaner Tomorrow

- Agro-industrial company in Nicaragua
- Mills, distributes and grows rice
- Has more than 50% of the rice market in Nicaragua
- Giant King Grass growing on AGRICORP plantation since 2012
- AGRICORP investors and VIASPACE have formed a special purpose company for the 12 MW power plant and Giant King Grass plantation
  - In development—not built
- "Energia Reino Verde"—Green Kingdom Energy

Rice as Far as You Can See

VIASPACE Clean Energy for a Cleaner Tomorrow

Rice as Far as You Can See

VIASPACE Clean Energy for a Cleaner Tomorrow

Biomass Power Plant Financing

- First banker's question now is "show me your fuel supply agreement."
  - We are "growing our own electricity"
- Power purchase agreement from a creditworthy counterparty
- Proven technology
- Qualified EPC contractor that will guarantee cost, schedule and performance
- Management/operations team

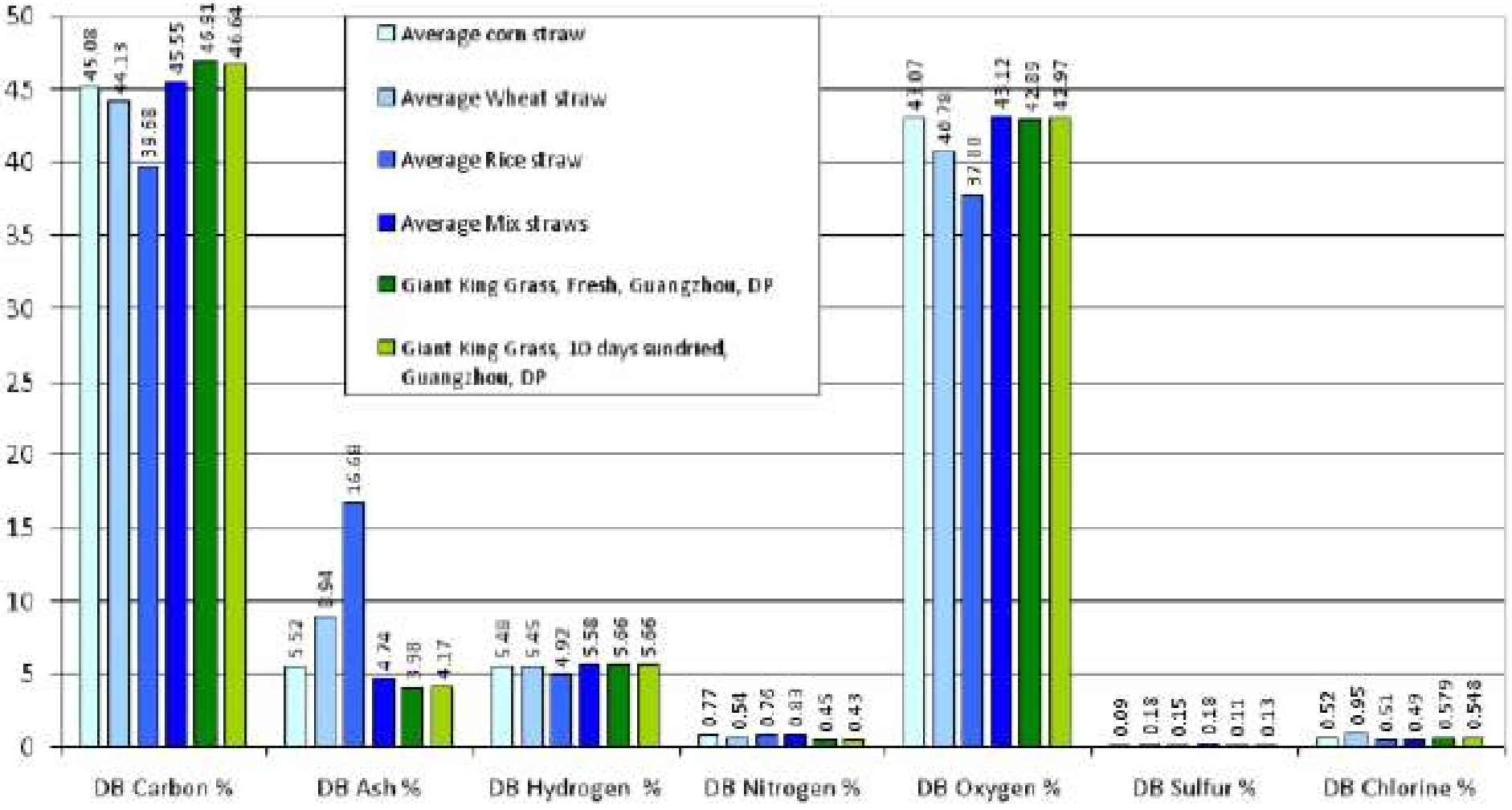
Nicaragua Renewable Biomass Energy Project Overview

VIASPACE Clean Energy for a Cleaner Tomorrow

- 12 MW biomass power plant designed for grass, straw & rice husk as fuel
  - Proven technology
  - Provides clean, reliable 24/7 base electricity
    - Dispatchable power
- Fueled by Giant King Grass
  - Dedicated energy crop
  - Sustainably grown
  - Irrigation and rainfall
  - Rice straw & husk as additional fuel

Ultimate Analysis-Comparison w/ Corn, Wheat and Rice Straws

VIASPACE Clean Energy for a Cleaner Tomorrow



Giant King Grass is very close to corn straw and wheat straw. Rice straw has higher ash. A boiler for corn straw can be used for Giant King Grass.

Agricultural Fuels Can Cause Slagging & Corrosion

VIASPACE Clean Energy for a Cleaner Tomorrow

- Low melting temp ash causes slagging
- High chlorine corrosion
- Must have proper boiler design

12 MW Power Plant Nicaragua

VIASPACE Clean Energy for a Cleaner Tomorrow

- 12 MW gross
- Efficiency
  - 32% w/14% moisture fuel
  - 28.5% w/50% moisture
- 11% internal use
- 7884 hours/year
- 84 M kwh saleable electricity
- 9 dry equivalent metric tons/hour fuel use
- Lifetime 25 years

- Operating costs/kwh
  - Fuel $0.038
  - Labor $0.008
  - Other $0.006
  - Total $0.052
- Debt 70%
  - 8.5%, 12 years
- Equity 30%
- All-in capital ~$3M/MW
  - EPC, civil works, grid connection, legal, plantation

Giant King Grass Plantation at AGRICORP Rice Plantation

VIASPACE Clean Energy for a Cleaner Tomorrow

- Located on 10,000 acre AGRICORP farm at Miramontes
  - 6000 acres planted in rice
  - 2100 acres of Giant King Grass to fuel initial 12 MW power plant
  - Giant King Grass already growing well there
- Irrigation from Lake Nicaragua in place
- Will leverage existing farm staff and infrastructure to lower costs
- Purchase special harvesting and transporting equipment for Giant King Grass
- Maximum distance to power plant is 5 km assuring simple logistics
- Reliable, low-cost, renewable fuel

Giant King Grass Grown in Nicaragua for 16 months

VIASPACE Clean Energy for a Cleaner Tomorrow

Expanded Giant King Grass Plantation

VIASPACE Clean Energy for a Cleaner Tomorrow

Planting by Hand

VIASPACE Clean Energy for a Cleaner Tomorrow

Irrigate Right after Planting

VIASPACE Clean Energy for a Cleaner Tomorrow

Mature Giant King Grass

VIASPACE Clean Energy for a Cleaner Tomorrow

Giant King™ Grass

VIASPACE Clean Energy for a Cleaner Tomorrow

- High yield, nonfood dedicated energy crop
- A natural proprietary hybrid, not genetically modified
- Sterile and noninvasive
- Propagated vegetatively like sugarcane
- Will grow on marginal land
- Tropical and subtropical grass
  - Will survive a frost, but not freezing weather
- Grows well in areas where sugarcane can be grown

Giant King™ Grass

VIASPACE Clean Energy for a Cleaner Tomorrow

- Perennial grass. Plant once and harvest for 7 to 10 years
- First harvest at 6 ½ months after planting when grass is 4 to 5 m tall and suitable for burning
- Subsequent harvests every 5-6 months
- For anaerobic digestion, Giant King Grass is harvested at 2m tall every 60 days
- In tropical area with good rainfall or irrigation, can harvest all year long when the fields are accessible
  - Continuous just-in-time harvesting simplifies logistics and storage and allows for a larger permanent workforce with few temporary workers

Giant King™ Grass

VIASPACE Clean Energy for a Cleaner Tomorrow

- C4 plant that thrives in hot weather
- Drought tolerant, but irrigation is highly recommended if there is an extended dry season in order to guarantee yields required for power plant
- High water use and fertilizer use efficiency
  - Efficiency= dry matter produced/water or fertilizer input
- No pesticide used in California

Giant King Grass Approved by US Department of Agriculture

VIASPACE Clean Energy for a Cleaner Tomorrow

- US Department of Agriculture has grown Giant King Grass and found it to be free of disease and pests
- Approved for distribution in US and for export
- USDA will inspect Giant King Grass and issue phytosanitary certificate for export

No phytosanitary certificate can be issued until an application is completed (7 CFR 353)

OMB NO. 0579-0052

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
PLANT PROTECTION AND QUARANTINE

PHYTOSANITARY CERTIFICATE

FOR OFFICIAL USE ONLY

PLACE OF ISSUE
San Diego, California

NO.
F-C-06073-03379890-7-N

TO: THE PLANT PROTECTION ORGANIZATION(S) OF
Myanmar

DATE INSPECTED
September 03, 2013

CERTIFICATION

This is to certify that the plants, plant product or other regulated articles described herein have been inspected and/or tested according to appropriate official procedures and are considered to be free from the quarantine pests, specified by the importing contracting party and to conform with the current phytosanitary requirements of the importing contracting party including those for regulated non-quarantine pests.

Giant King Grass

VIASPACE Clean Energy for a Cleaner Tomorrow

- 15 + feet tall in 6 months
- Harvest 2 times a year
- Growing in
  - US-California, Texas, Arizona, Hawaii
  - St. Croix, US Virgin Islands
  - Nicaragua
  - Myanmar
  - South Africa
  - China

Mechanical Planting of Giant King Grass in Arizona

VIASPACE Clean Energy for a Cleaner Tomorrow

Harvest with Machete

VIASPACE Clean Energy for a Cleaner Tomorrow

Manual Harvesting with Gas Powered Cutter

VIASPACE Clean Energy for a Cleaner Tomorrow

Mechanical harvesting

Plantation on Lake Nicaragua

VIASPACE

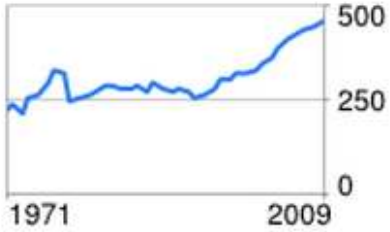
Clean Energy for a Cleaner Tomorrow

12 MW Giant King Grass Power Plant in Nicaragua

VIASPACE Clean Energy for a Cleaner Tomorrow

- Provides clean renewable base electricity
- Reliable 24 hours/day
- Not intermittent like wind and solar . Complements hydro
- Lower cost than oil and solar
- Plantation and power plant provide jobs
- Electricity infrastructure for people and industry
- Utilizes the natural resources of Nicaragua– sunshine, warm weather and water
- Sustainable agriculture
- Money stays in Nicaragua rather than spending money for oil overseas

Electricity consumption per capita, Nicaragua



www.google.com/publicdata
460 kWh per capita - 2009
Source: World Bank

Disclaimer

Electricity consumption per capita, Mexico

www.google.com/publicdata
1,943 kWh per capita - 2009
Source: World Bank

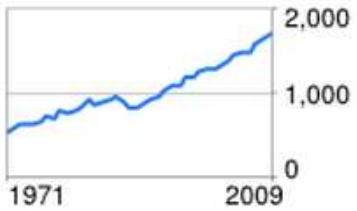
Disclaimer

Electricity consumption per capita, Costa Rica

www.google.com/publicdata
1,813 kWh per capita - 2009
Source: World Bank

Disclaimer

Electricity consumption per capita, Panama



www.google.com/publicdata
1,735 kWh per capita - 2009
Source: World Bank

Disclaimer

Project status

VIASPACE Clean Energy for a Cleaner Tomorrow

- ✓ Pre-feasibility study
- ✓ SPV company established
- ✓ Presentation to investors (debt and equity)
- Feasibility study in progress
- Provisional generation license and other contracting tasks in progress
- Financial closure

Giant King Grass Growth Cycle in California

Perennial Crop, Plant Once Harvest Many Times

Giant King Grass growing in California

Giant King ™ Grass
March 17, 2013– Just Harvested

VIASPACE Clean Energy for a Cleaner Tomorrow

Surface or subsurface drip tape irrigation, row & furrow or flood irrigation can be used.

Giant King ™ Grass
March 27– Regrowth in 10 days

VIASPACE Clean Energy for a Cleaner Tomorrow

Giant King Grass in the left rear is 18 feet tall

Giant King ™ Grass
April 18, 2013– One Month Old

VIASPACE
Clean Energy for a Cleaner Tomorrow

Giant King ™ Grass
May 13, 2013– Two Months Old

VIASPACE Clean Energy for a Cleaner Tomorrow

Ready for harvest for animal feed (14.9% crude protein) or anaerobic digestion
For reference VIASPACE CEO Dr. Carl Kukkonen is 6'1" (185 cm) tall

Giant King ™ Grass
May 30, 2013– 2 ½ Months Old

VIASPACE
Clean Energy for a Cleaner Tomorrow

Giant King ™ Grass
July 2, 2013– 3 ½ Months Old

VIASPACE
Clean Energy for a Cleaner Tomorrow

Giant King ™ Grass
July 31, 2013– 4 ½ Months Old

VIASPACE
Clean Energy for a Cleaner Tomorrow

Giant King ™ Grass
August 28, 2013– 5 ½ Months Old

VIASPACE Clean Energy for a Cleaner Tomorrow

Ready for propagation or harvest

Giant King ™ Grass
September 29, 2013– 6 ½ Months Old

VIASPACE
Clean Energy for a Cleaner Tomorrow

Strong growth– ready for harvest or propagation
For reference VIASPACE CEO is 6'1" (185 cm) tall

Full Production Scale Grinding Test 2/18/14

VIASPACE Clean Energy for a Cleaner Tomorrow

Giant King Grass Has Been Extensively Tested With Consistent Results

VIASPACE Clean Energy for a Cleaner Tomorrow

Proximate Analysis	Unit	Sun Dried As Received	Giant King Grass Bone Dry
Total Moisture	**%**	**14**	**0**
Volatile Matter	**%**	**65.68**	**76.37**
Ash	**%**	**3.59**	**4.17**
Fixed Carbon	**%**	**16.74**	**19.46**
Total Sulfur	**%**	**0.11**	**0.13**
HHV	**MJ/Kg**	**15.85**	**18.43**
LHV	**MJ/Kg**	**14.52**	**-**

Giant King Grass Pellets as Coal Replacement

VIASPACE Clean Energy for a Cleaner Tomorrow

- Giant King Grass pellets can replace up to 20% of coal in an existing coal-fired power plant
  - Burning coal and biomass together is called cofiring
  - Requires small modification
- Preserves large capital investment in existing power plant with 30 year additional life
- Meets carbon reduction targets
- 16M tons of pellets used globally today
  - 46M tons by 2020
- Grass is grown, dried and pressed into pellets and shipped in bulk like shipping grain
- Large global demand
  - Particularly in Europe
  - Korea, China, Japan emerging

Test Data on Giant King Grass Shows Consistency of Product

VIASPACE Clean Energy for a Cleaner Tomorrow

Composition Determination

Parameter	Amount (a.r.)	Amount (o.d.)
Total Moisture	8,81	
Moisture Airdry		
Ash	4,66	5,11
Volatile matter incl. moisture.		
Volatile matter	70,34	77,14
Fixed Carbon	16,18	17,75
Gross Calorific Value	4055,2	4446,9
	16,978	18,618
Nett Calorific Value (cV)	3742,1	
	15,667	
	6735,7	
Nett Calorific Value (cP)	15,592	

TLR international laboratories

国家煤炭质量监督检验中心
China National Coal Quality Supervision and Testing Center

SGS

Biogas Power Plant is Option Thousands Operating in Europe

VIASPACE Clean Energy for a Cleaner Tomorrow

Completely stirred anaerobic digester

engine generator set

1 MW engine generator set in container

Waste engine heat used to heat greenhouses

When Cut at 5-7 Feet Tall Giant King Grass Is Excellent Animal Feed

VIASPACE Clean Energy for a Cleaner Tomorrow

Feeding Cattle

VIASPACE Clean Energy for a Cleaner Tomorrow

FORAGE TESTING LABORATORY
DAIRY ONE, INC.
730 WARREN ROAD
ITHACA, NEW YORK 14850
607-257-1272 (fax 607-257-1350)

Sampled	Recvd	Printed	ST	CO
	05/15/13	05/16/13		

B3
CARL KUKHONEN
33841 MERCATOR ISLE
DANA POINT, CA 52629

ENERGY TABLE - NRC 2001

	Mcal/Lb	Mcal/Kg
DE, 1X	1.14	2.52
ME, 1X	0.95	2.10
NEL, 3X	0.53	1.17
NEM, 3X	0.55	1.22
NEG, 3X	0.30	0.65
TDN1X, %	55	

Sample Description	Farm	Code	Sample
FR GRASS FORAGE		203	19216470

Analysis Results

Components	As Fed	DM
% Moisture	85.0	
% Dry Matter	15.0	
% Crude Protein	2.2	14.9
% Available Protein	2.2	14.5
% ADICP	.1	.4
% Adjusted Crude Protein	2.2	14.9
Soluble Protein % CP		43
Degradable Protein%CP		70
% NDICP	.5	3.5
% Acid Detergent Fiber	5.5	36.7
% Neutral Detergent Fiber	10.0	66.6
% Lignin	.6	3.8
% NFC	1.2	7.8
% Starch	<0.1	.2
% WSC (Water Sol. Carbs.)	1.1	7.4
% ESC (Simple Sugars)	.9	6.3
% Crude Fat	.3	2.3
% Ash	1.79	11.92
% TDN	9	60

Giant King Grass Can Be Used As Feedstock for Biofuels, Biochemicals and Biomaterials

Giant King Grass is the Same as Corn Stover w/ Much Higher Yield

VIASPACE Clean Energy for a Cleaner Tomorrow

Composition Dry Weight %	Giant King Grass	Corn Stover
Glucan	43.0	37.4
Xylan	22.3	21.1
Arabinan	2.9	2.9
Lignin	17.4	18.0
Ash	4.5	5.2

Notes and references:
Giant King Grass: average of samples cut at 4 m tall
Corn Stover: Aden et al. NREL/TP-510-32438, 2002

Composition- Glucan Xylan & Arabinan are sugars for cellulosic ethanol. Lignin & ash are byproducts

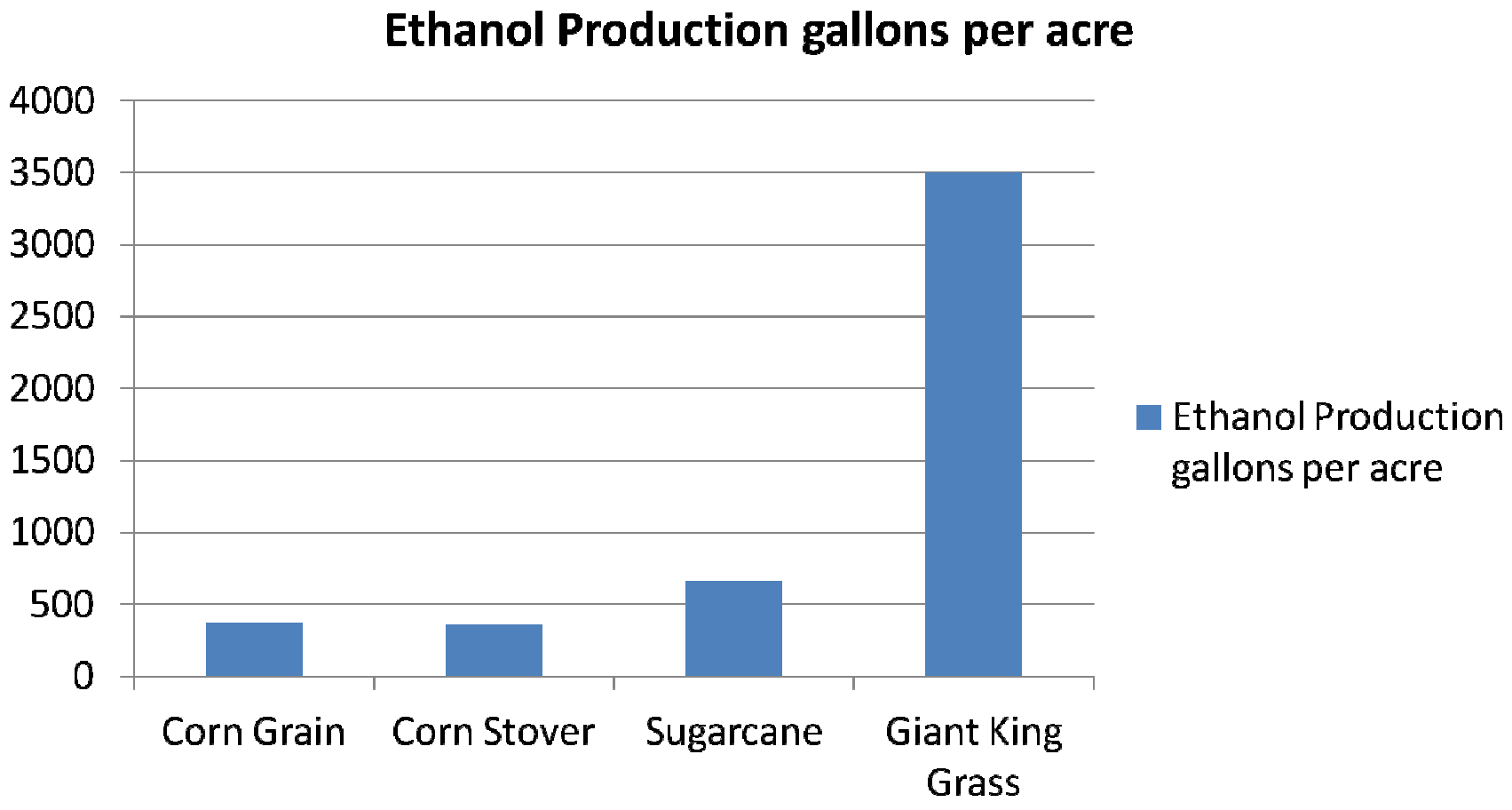
One dry ton of Giant King Grass is slightly better than corn Stover for cellulosic ethanol

Yield Dry Matter	Giant King Grass	Corn Stover
US ton/acre	44	3.5-4.7
Metric ton/ha	100	8.6-11.6

Giant King Grass has much higher yield per acre than corn

High Yield of Giant King Grass Means High Ethanol Production

VIASPACE Clean Energy for a Cleaner Tomorrow



Bioenergy Applications of Giant King Grass

VIASPACE Clean Energy for a Cleaner Tomorrow

- **Direct combustion in electric power/ heat/steam plant**
- **Pellets for co-firing with coal**
- **Briquettes for boilers**
- **Biogas /anerobic digestion**
- *Cellulosic liquid biofuels-- ethanol/butanol*
- *Biochemicals and bio plastics*
- *Pyrolysis to bio oil*
- *Catalytic coversion to bio diesel*
- *High-temperature gasification*
- *Torrefaction to bio coal*
- *Pulp for paper and textiles*

Applications that are commercial today with agricultural & forestry waste that can use Giant King Grass instead

Low cost of Giant King Grass will allow commercial applications in future

Imperial County California
Mesquite Lake Water and Power

VIASPACE Clean Energy for a Cleaner Tomorrow

- Partner owns closed 16 MW biomass power plant in Imperial California
  - Plans to reopen with portion of fuel from Giant King Grass, majority from wood waste
- Has option on adjacent closed 16 MW manure gasifier power plant.
  - Plans to convert to biofuels plant with GKG feedstock

Tibbar Energy
St. Croix, Virgin Islands

VIASPACE Clean Energy for a Cleaner Tomorrow

- Planned 7 MW biogas power plant
- Giant King Grass growing well
- Tibbar awarded power purchase agreement
- All permits in place

Benefits of Giant King Grass

VIASPACE Clean Energy for a Cleaner Tomorrow

- Renewable, low carbon energy source that can be locally grown and provide jobs & energy security
  - Less expensive than oil or liquefied natural gas
- Can generate electricity 24 hours per day
  - Solar and wind are intermittent not base power
  - Less expensive than solar, no backup needed
- Carbon neutral electricity production and growth
- Uses modern sustainable agriculture practices
- Can also feed cattle, dairy cows, pigs and other animals or make pellets for export
- In the future, Giant King Grass feedstock can produce liquid biofuels, biochemicals and

Advantages of Giant King Grass

VIASPACE Clean Energy for a Cleaner Tomorrow

- "Platform" energy crop for many bioenergy applications
  - Electricity, pellets, biofuels, biochemicals & bio plastics
- Excellent animal feed with high protein
- Lowest cost--Can meet cost targets for energy & biofuels applications because of high yield of Giant King Grass
  - Less expensive than agricultural waste
- Perennial crop
  - Do not have to plant every year, just harvest
  - Short rotation—first harvested in 6.5 months
- Provides reliable, well documented, consistent quality fuel or feedstock with predictable, affordable price

Thank You

VIASPACE Clean Energy for a Cleaner Tomorrow