



# How global partnerships are clearing the way to achieve America's RFS2 goals.

*U.S. Department Of Energy*  
*BIOMASS 2012*







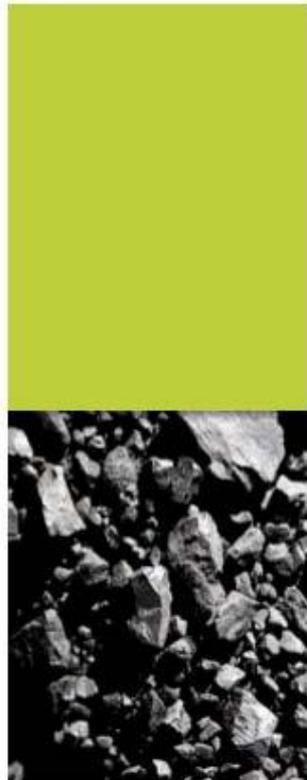
Denmark is committed to a low-carbon future.

**DONG**  
energy

**15 / 85** → **50 / 50** → **85 / 15**



2006



2020



2040

# DONG Energy's New Bio Solutions – a family of technologies for converting waste into clean energy.

**Inbi  
con**



## From cellulosic biomass to The New Ethanol and Power (and biochemicals)

- Demo plant 4t/h wheat straw
- Technology efficacy 4Q **2010**

 **REnescience**  
value from waste



## Separation of municipal solid waste for efficient energy utilization

- Pilot plant 1 t/h of MSW
- Proof of concept includes biogas
- 4Q **2011**

**Pyroneer**  
Biomass Gasification



## Gasification of low value biomass to high value energy products

- Small scale demonstration plant under commissioning, 6 MW
- Proof of concept 4Q **2012**

*Leip*mark

Inbicon Biomass Refinery demonstration plant at Kalundborg,  
Denmark. Capacity: 100MT/day



Inbicon A/S  
2010

# Inbicon Biomass Refinery: enzymatic processing

We utilize a three-stage conversion: mechanical conditioning of the biomass, hydrothermal pre-treatment, and enzymatic hydrolysis. It releases the building blocks of the plant material—cellulose, hemicellulose, and lignin—which we convert into three green energy streams: cellulosic ethanol, which we call The New Ethanol; a solid lignin biofuel, and C5 energy molasses.



# Inbicon Biomass Refinery: biomass handling

We bring to North American projects the DONG Energy know-how.



# Inbicon Biomass Refinery: fermentation, distillation and dehydration

The fermentation, distillation and dehydration are just like the old ethanol.



# Inbicon Biomass Refinery: the keystone technology driving creation of renewable energy parks in North America

Integrated with other technologies, the biomass refinery maximizes the marketing value of each ton of biomass to create sustainable businesses.



# Statoil blending The New Ethanol for Danish drivers.



1,197 mpg with the New Ethanol.  
Winner of the Shell Eco-marathon.

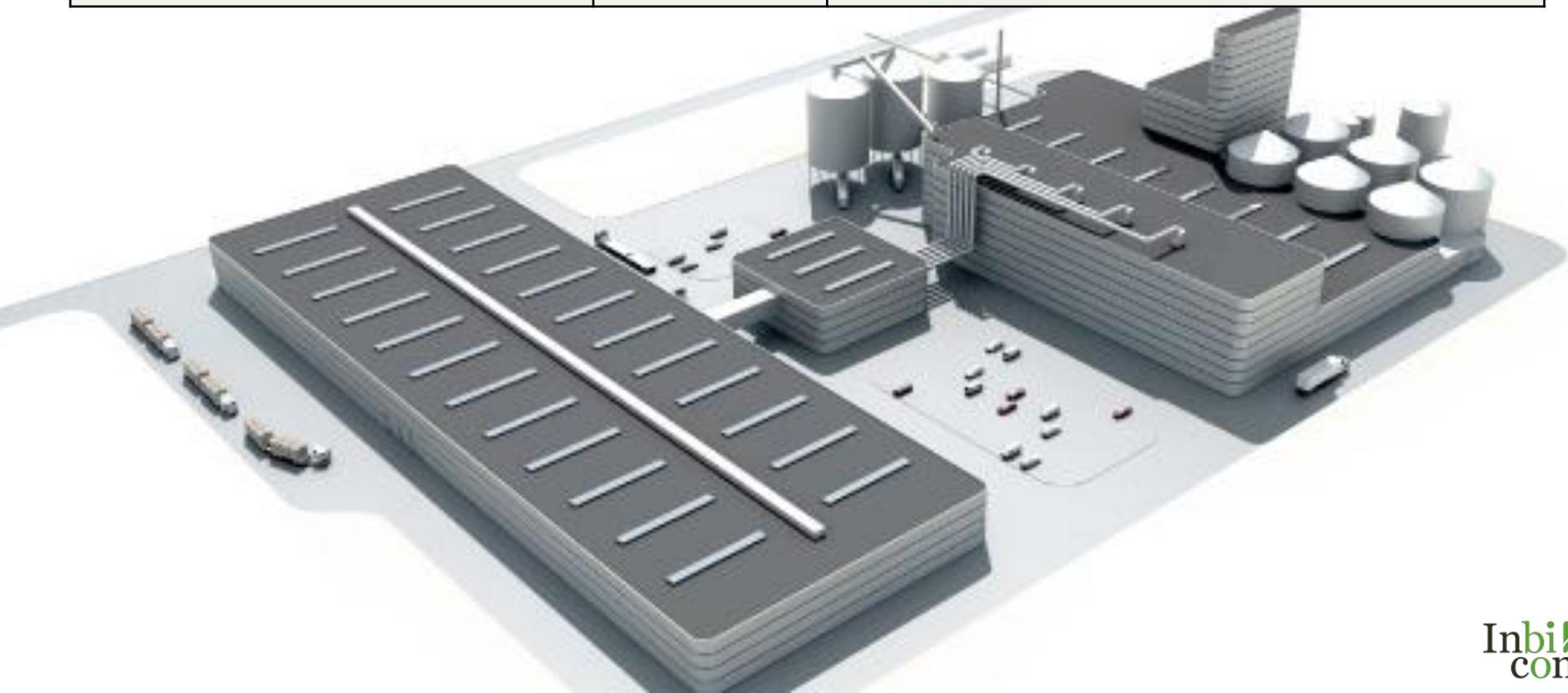


Inbicon Biomass Refinery designed to process 50MT/h of biomass: corn stalks, wheat straw, sugar bagasse, energy grasses, etc.



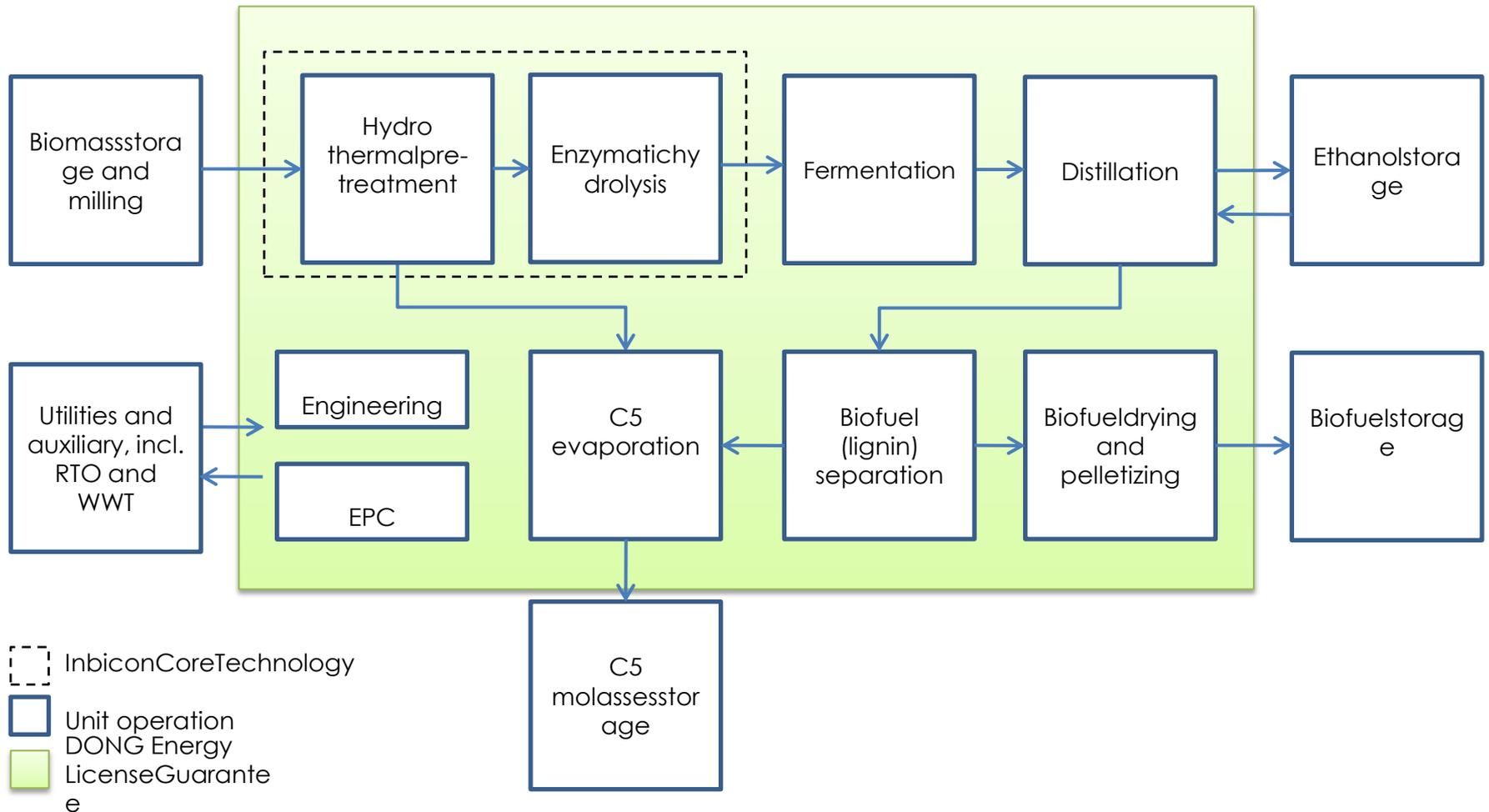
# Inbicon Biomass Refinery input: 50MTph biomass

Output	Stream	Production
Cellulosic Ethanol	7.2MTph	20MMgy The New Ethanol
Clean Lignin	19.2MTph	27MW green power
C-5 Commercial Sugars	19.7MTph	18MW power / specialty chemicals / surfactants



# Inbicon Biomass Refinery

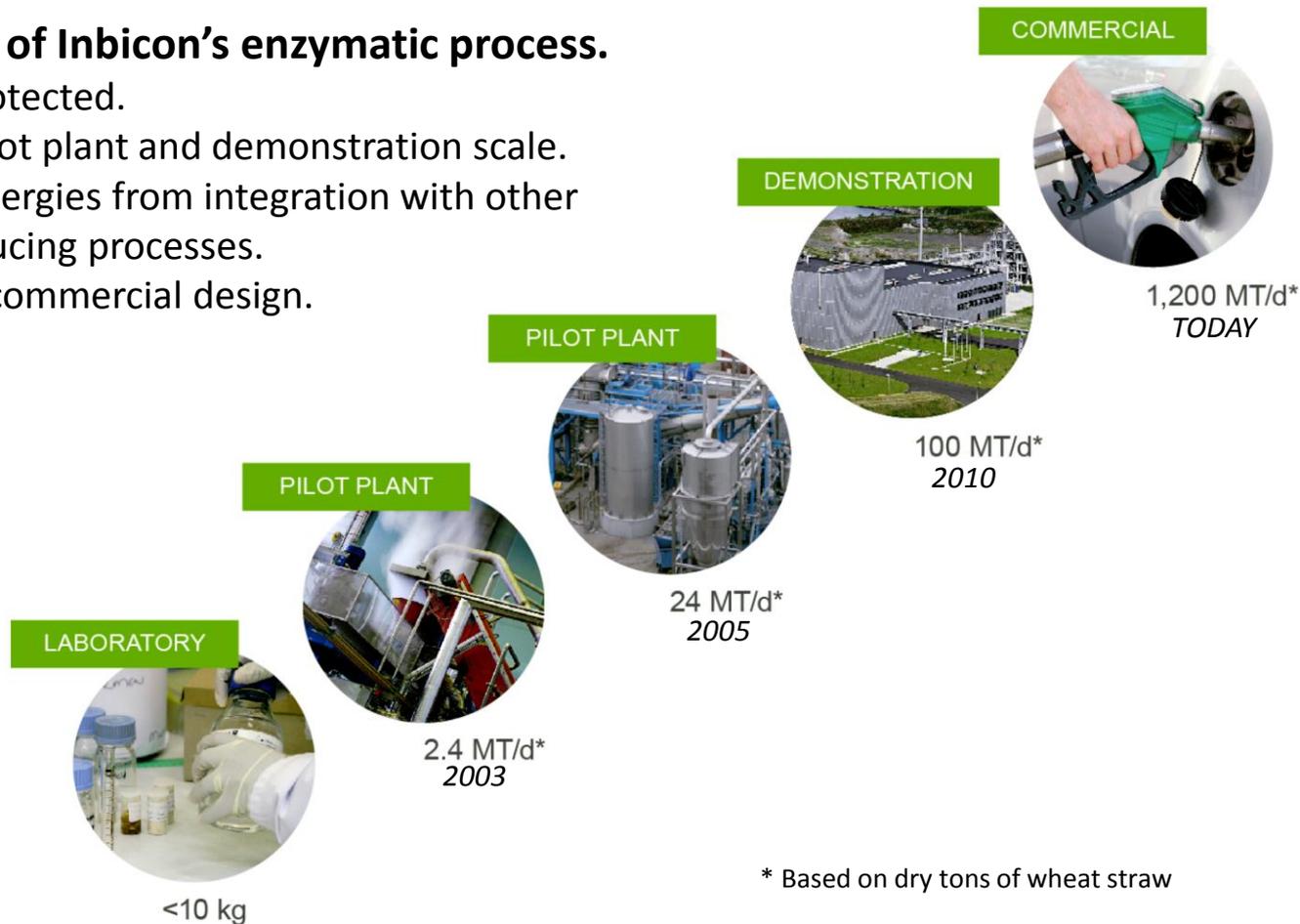
## DONG Energy process guarantees



# Why Inbicon? The largest operating cellulosic refinery today and licensing available for commercialization.

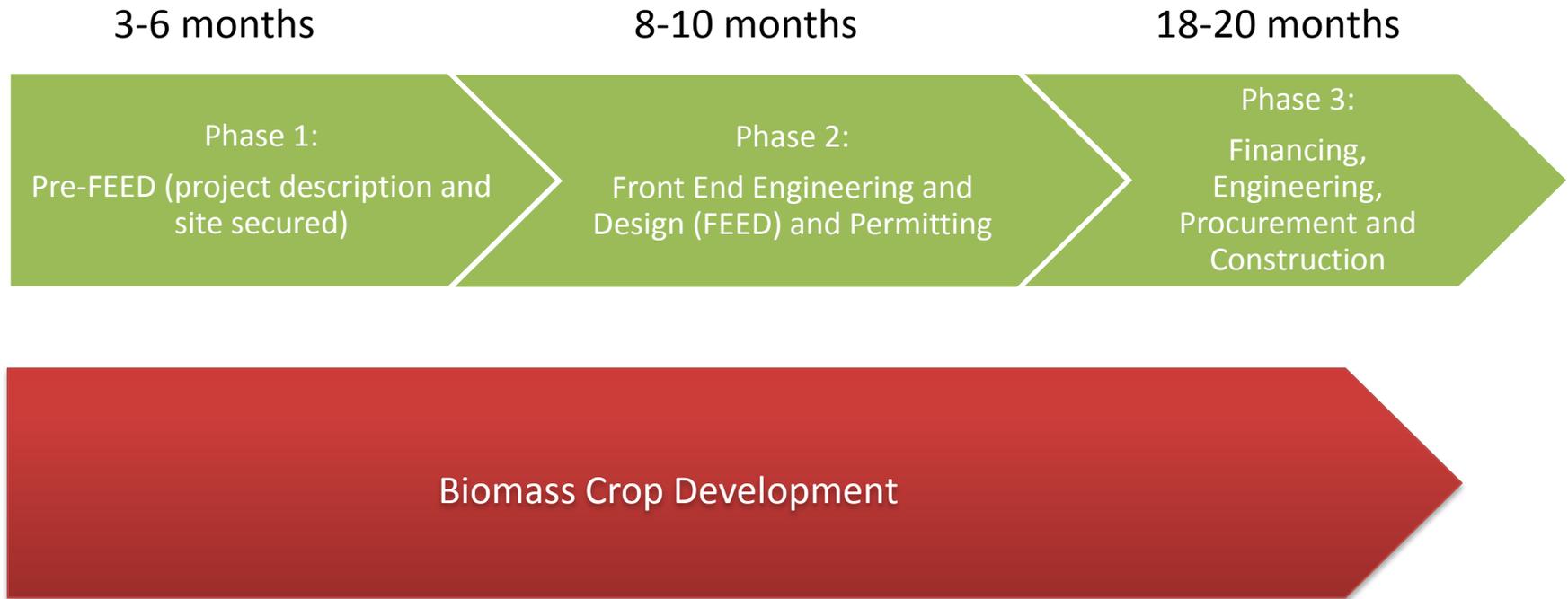
## Advantages of Inbicon's enzymatic process.

- Patented-protected.
- Proven at pilot plant and demonstration scale.
- Excellent synergies from integration with other energy-producing processes.
- Engineered commercial design.

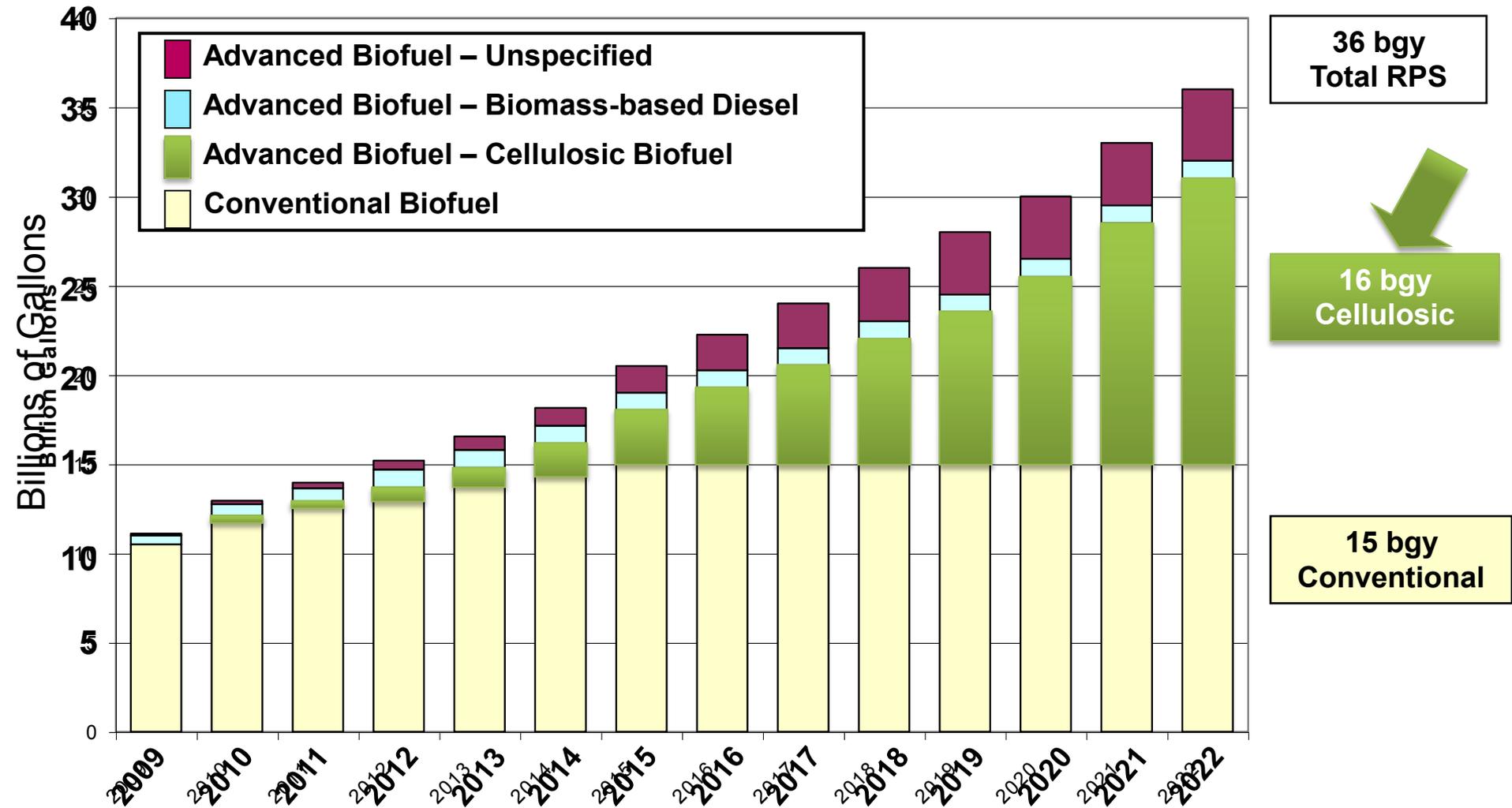


\* Based on dry tons of wheat straw

# Typical Project Schedule of Inbicon Biomass Refinery



# Market Demand: 16 billion gallons of Cellulosic Biofuel a year to satisfy U.S. Renewable Fuel Standard 2 by 2022.



\*Source: Renewable Fuels Standard policy, U.S. Environmental Protection Agency

# Inbicon Biomass Refinery

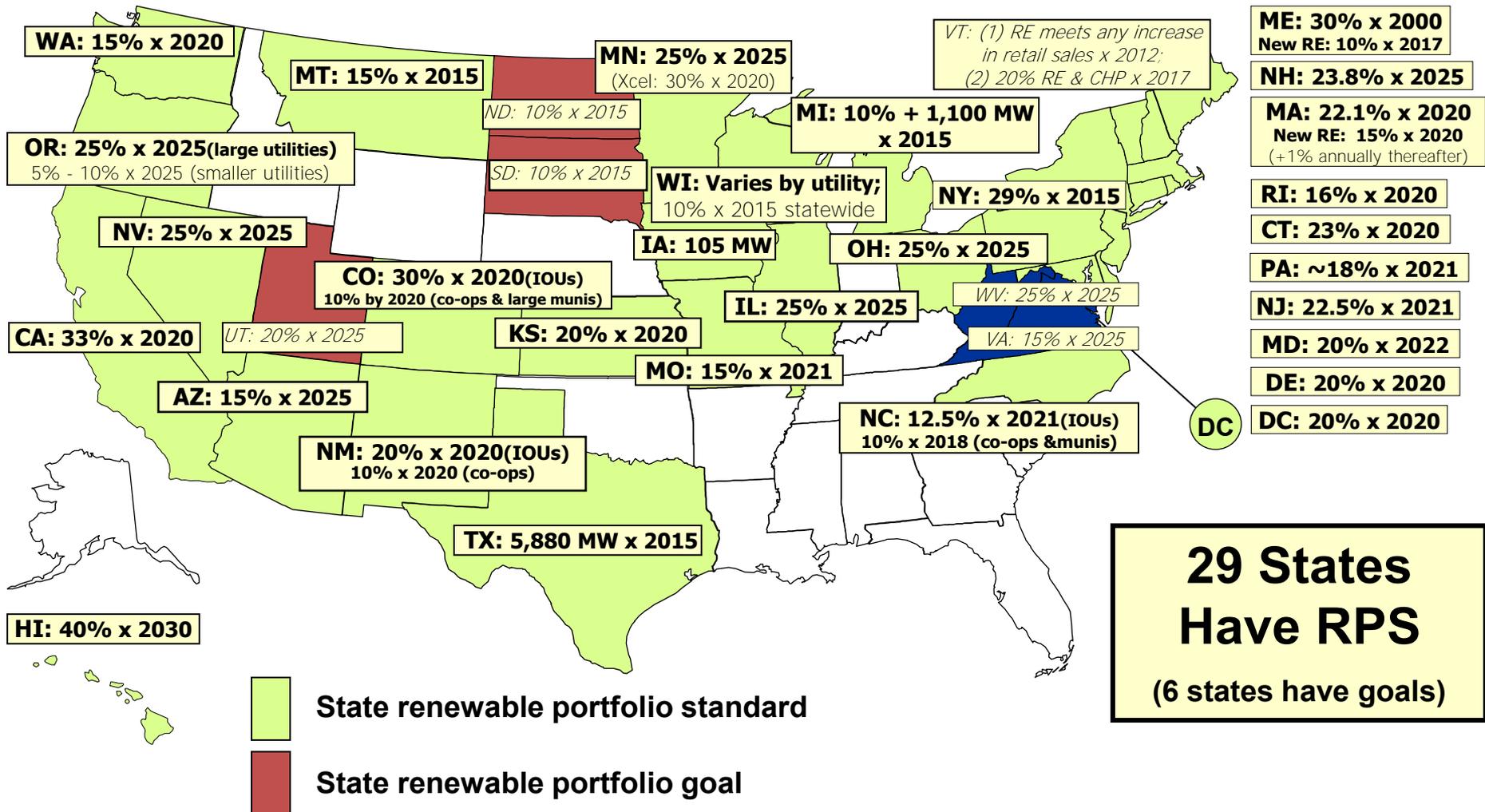
**The New Ethanol.  
The New Power.  
The New Chemistry.**

# Clean lignin to replace coal in North American power plants.



	Coal	Lignin
Net Caloric Value (MJ/kg) (constant pressure – ash free)	24	21
Typical Moisture (%)	8.3	10.0
Carbon (%dm)	65.1	55.8
Hydrogen (%dm)	3.7	5.8
Ash (%dm)	13.8	7.2

# Market Demand: Green Electricity to satisfy Renewable Portfolio Standards in 29 states.

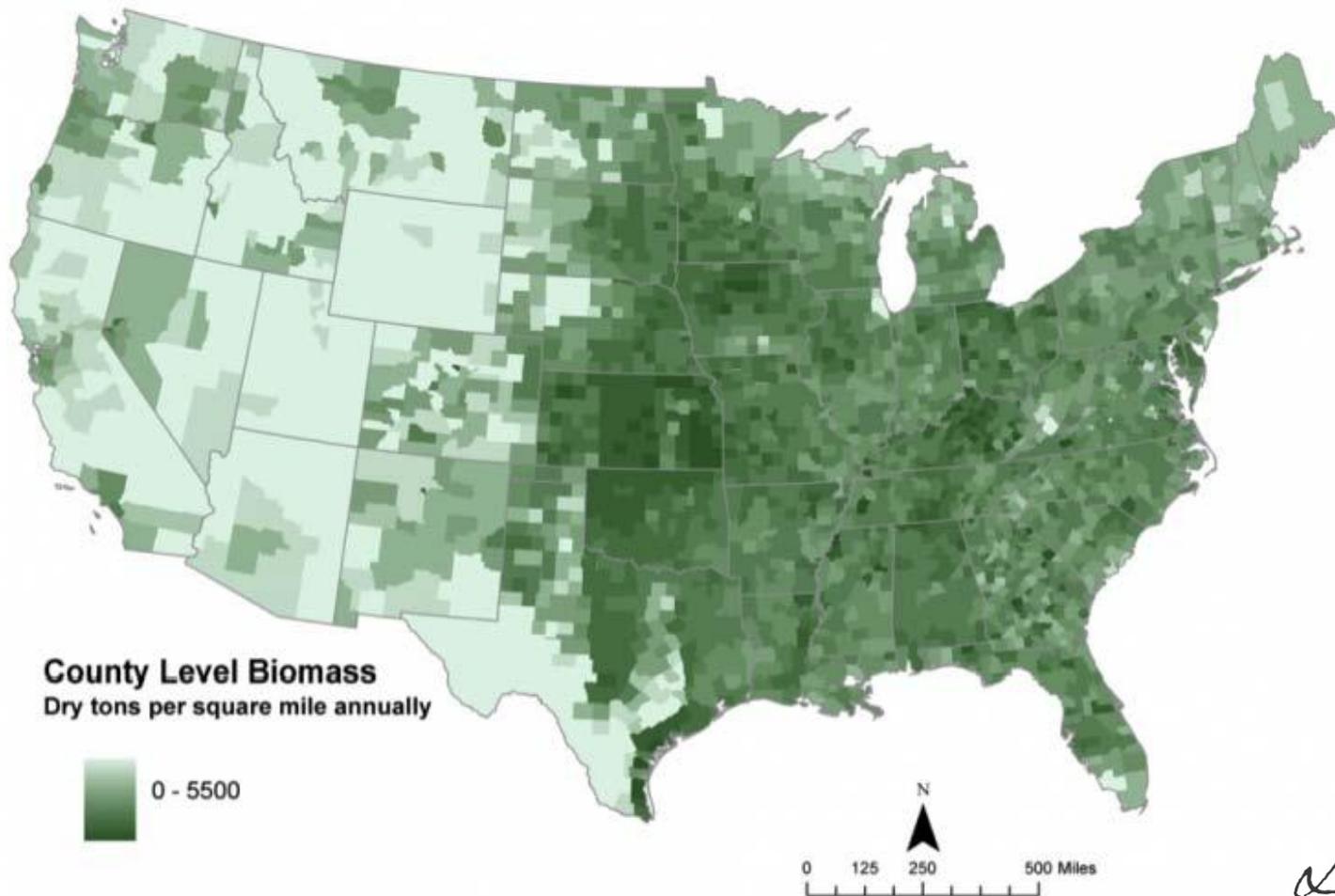


**29 States  
Have RPS**  
(6 states have goals)

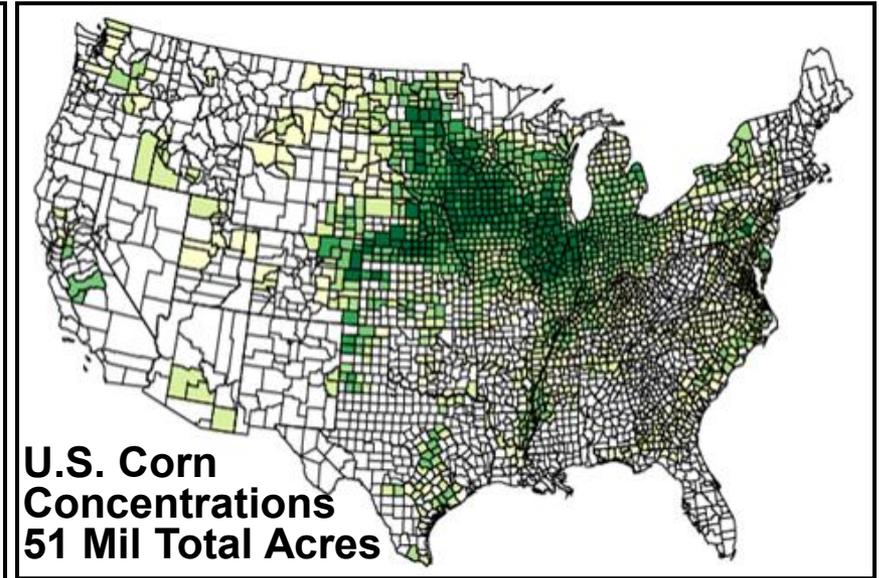
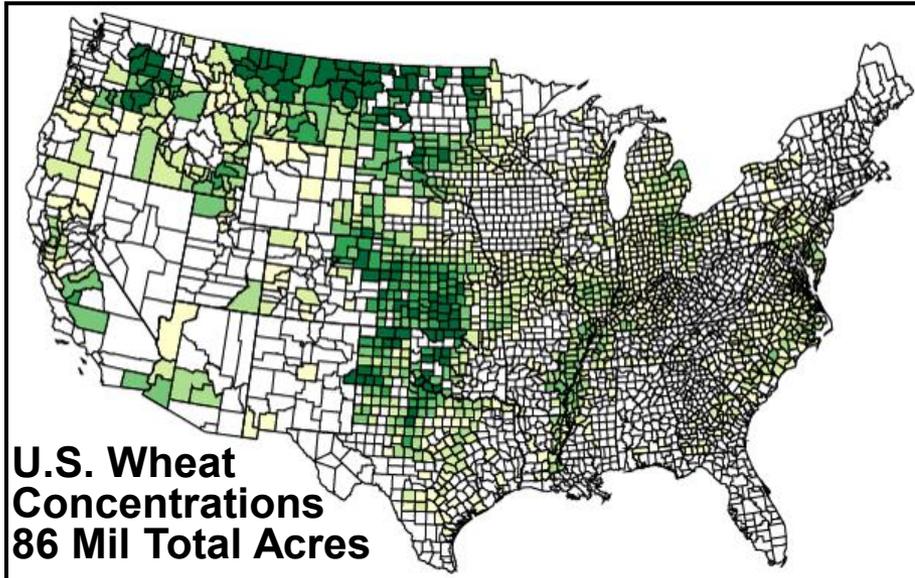
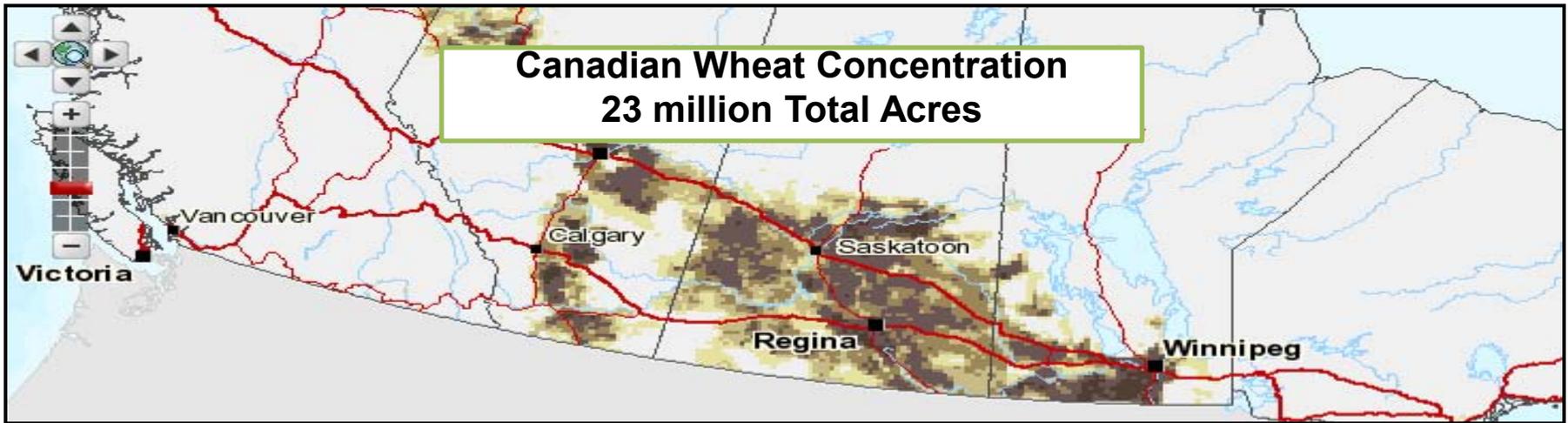
\*Source: U.S. Dept. of Energy & [www.dsireusa.org](http://www.dsireusa.org)

The 2011 Billion-Ton report concluded the U.S. has the ability to annually produce a billion dry tons of biomass for biofuels, biopower, and bioproducts.

Feedstock resources identified in the report could produce about 85 billion gallons of biofuels. That's enough to replace approximately 30 percent of the nation's current petroleum consumption.



Raw material: Over 163 million acres of crop-residues harvested each year in North America is available for biomass projects.



With 76% of the 160 million acres of agricultural residues in North America, Inbicon Biomass Refinery projects can produce 20,000 MW of green electricity and 10 Bgy The New Ethanol.

	Wheat Acreage	Corn Acreage	Total Acreage		MW of Electricity*	Gallons of Ethanol*
<b>United States</b>	51 M	86 M	137 M		18,000	9 Billion
<b>Canada</b>	23 M	3 M	23 M		2,000	1 Billion
<b>TOTALS</b>	<b>74 Million</b>	<b>89 Million</b>	<b>160 Million</b>		<b>20,000</b>	<b>10 Billion</b>

\* Electricity and Ethanol production (annual)

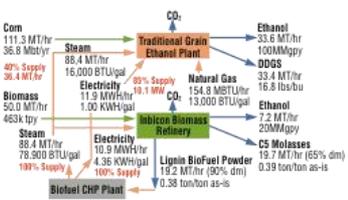
Assumes Inbicon plant @ 50 MT biomass per hour 50 MW power and 20 MMgpy Ethanol per plant  
1 tpa wheat straw and 2 tpa corn stover available

# DONG Energy has spent 4 years introducing the Inbicon Biomass Refinery to North America. We are now ready to build.

CELLULOSIC IS  
YOUR SEED CORN.  
PLANT NOW.



**Add three cellulosic energy streams with an Inbicon Biomass Refinery.** The future of corn ethanol is The New Ethanol™—stover ethanol, made from the leftovers of the harvest. The U.S. market alone begins at 16 billion gallons a year by 2022, courtesy RFS2. The future is also clean lignin and C5 molasses—the two other renewable energy streams produced at commercial scale by a 1200 MT/day Inbicon Biomass Refinery. It's designed to integrate symbiotically with a new or existing 110-gallon corn or wheat plant. Using no fossil fuels, it can turn the lignin into all the steam and electricity you need to process the biomass. And even produce enough extra energy to offset your grain plant's utility costs 50-100%. The C5 can produce more energy or DDG supplement or higher-value bio-chemicals.



**Why Inbicon?** Because we've proven our technology at demonstration scale, processing 4 MT/hour of wheat straw at our first Inbicon Biomass Refinery in Kalundborg, Denmark. And since 2010, we've been licensing it for commercial production internationally.

**Why now?** Because all the tweaks you're making to your old plant won't keep your business model from becoming obsolete when clean cellulosic energy and lower carbon counts become the market drivers for all fuels. And because we're now integrating multiple energy streams and multiple technologies into winning business platforms.

So ethanol producers can improve Life Cycle Analysis, shrink GHG footprint, capture RINs, and collect RPS premiums for selling green electricity to the grid. Ask about our other ideas to reduce energy loads and earn higher income from higher-value energies.

For an overview of Inbicon technology, go to [www.inbicon.com](http://www.inbicon.com). To start planning your cellulosic future, contact Thomas Corle at 717-626-0557 or [tcorle@leifmark.com](mailto:tcorle@leifmark.com).

Inbicon Biomass Refinery. Making ethanol work for the world.™ **Inbi con**

DONG Energy first to co-fire biomass with coal at its power stations in Denmark.

**DONG**  
energy



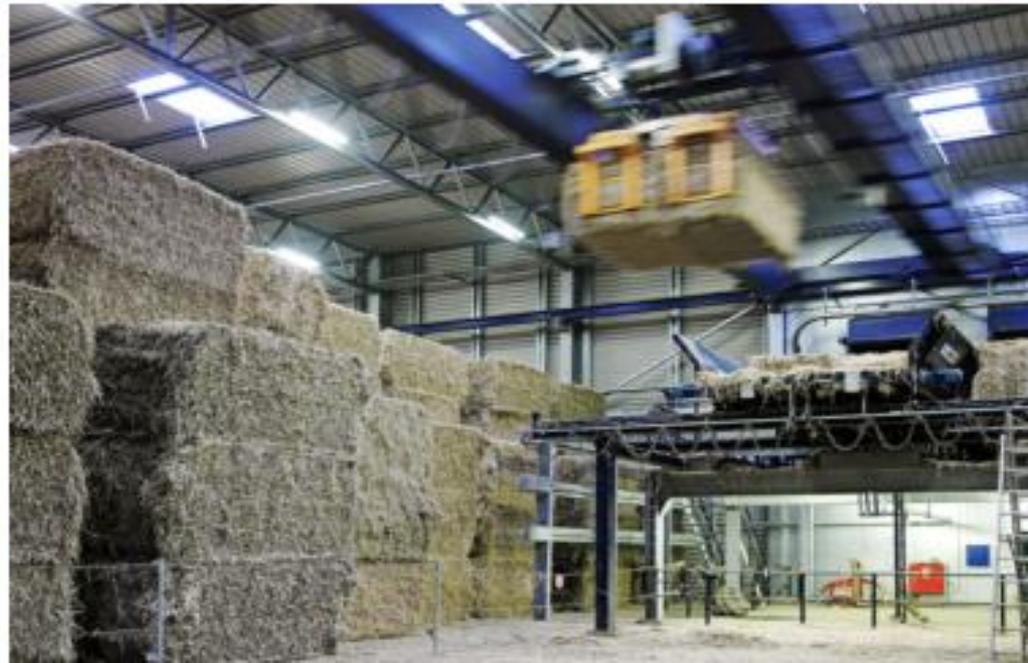
DONG Energy has 20+ years of logistical & business solutions to biomass collection and handling.

**DONG**  
energy



Currently working in North America on biomass knowledge transfer and collaboration among experts in diverse fields.

**DONG**  
energy



# Inbicon and Leifmark have aligned with partners to make the biomass business work in North America.

THERE'S MORE TO  
THE NEW ETHANOL  
THAN ETHANOL



*Gathering feedstock for The New Ethanol takes new farm machinery, like this New Holland harvester and Cornrower™ which made dirt-free windrows of stover while harvesting corn for our biomass tests done in Indiana, USA Fall 2011*

There's less carbon in the atmosphere when you integrate your grain plant with an Inbicon Biomass Refinery. California is the lowest common denominator when it comes to carbon. And it's the bellwether for other states. Can you cut your carbon low enough to meet the tougher standards?

Don't say "impossible." By licensing Inbicon second-generation technology and fusing it with your first-generation operation, you can shrink your overall carbon scores to next to nothing.

Here's why. Our 20 MMgy model creates unique synergies when it's combined with your existing grain-ethanol plant. In addition to The New Ethanol, you'll get two significant co-products. The clean lignin can generate all the steam and electricity you need to process the biomass. It may even produce enough extra thermal and electrical energy to offset the majority of your grain plant's utility costs.

Cellulosic sugars are an equally important co-product. We've partnered with companies planning to convert sugar streams into high-value bioplastics, biochemicals, and livestock feed.



What's more, you can harvest both the corn grain and the corn stalks from the very same fields. Our typical commercial model, which processes 1320 tons a day, will need around 200,000 acres to keep it well-fed. About the acreage you're now harvesting for your 100 MMgy grain plant.

For a greener planet, a bluer sky, and a better business, erase the gap between where your carbon is today and where it could be in just two years. We've proven Inbicon technology at Kalundborg, and we're planting commercial-scale biomass refineries in North American cornfields now.

Get a tech overview at [www.inbicon.com](http://www.inbicon.com). International projects, talk to Christian Morgen. In North America, contact Thomas Corle at 717-626-0557 or [tcorle@leifmark.com](mailto:tcorle@leifmark.com).

**Inbicon Biomass Refinery. Making ethanol work for the world.™**



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New Holland Cornrower™ is a registered trademark of CNH America LLC.

Leifmark

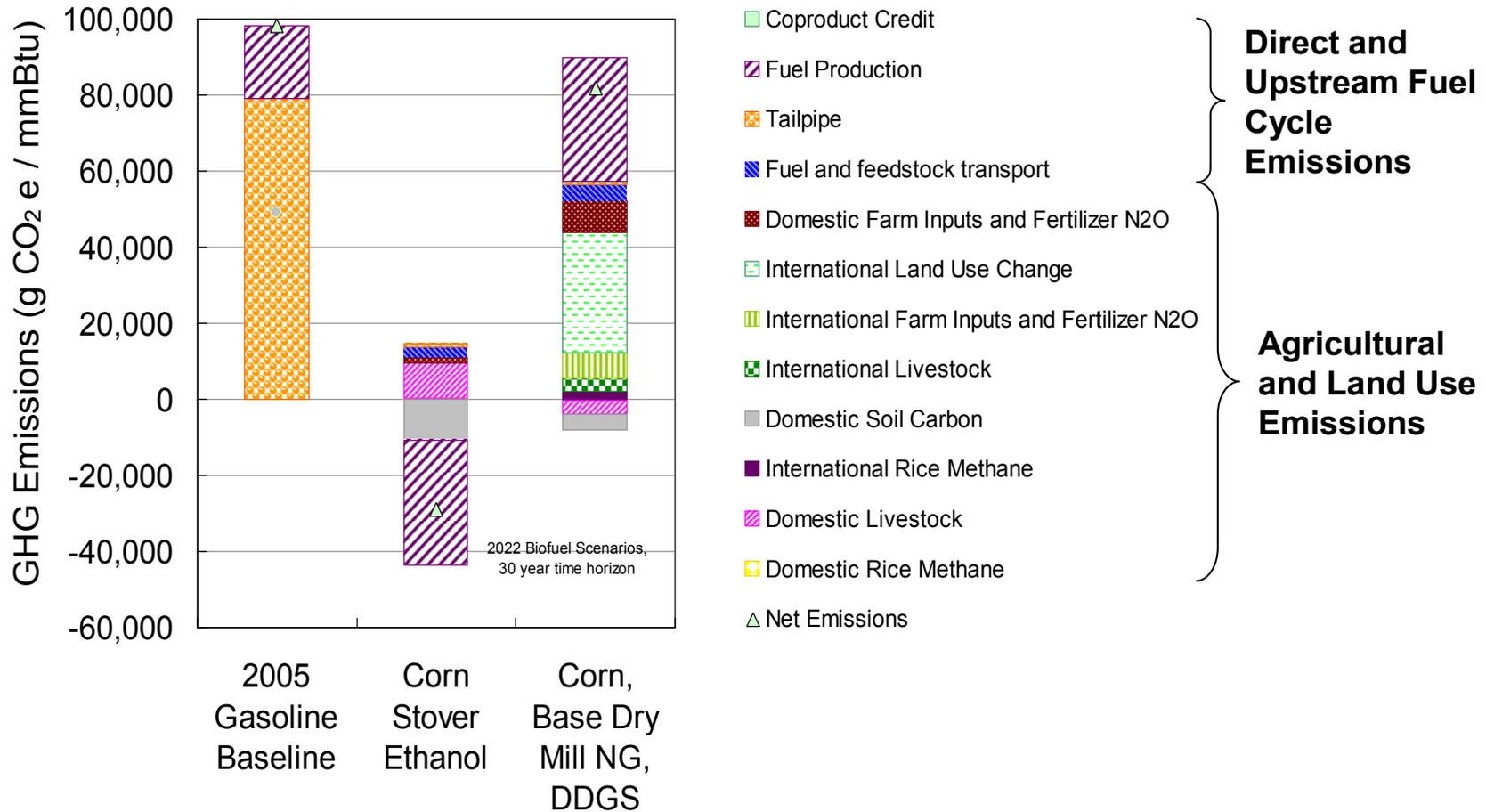
Wherever you find biomass growing, you'll find Inbicon working.



**Think differently.**

**Create sustainably.**

# Inbicon Biomass Refinery Exceeds the U.S. EPA.'s RFS2 standard GHG requirements



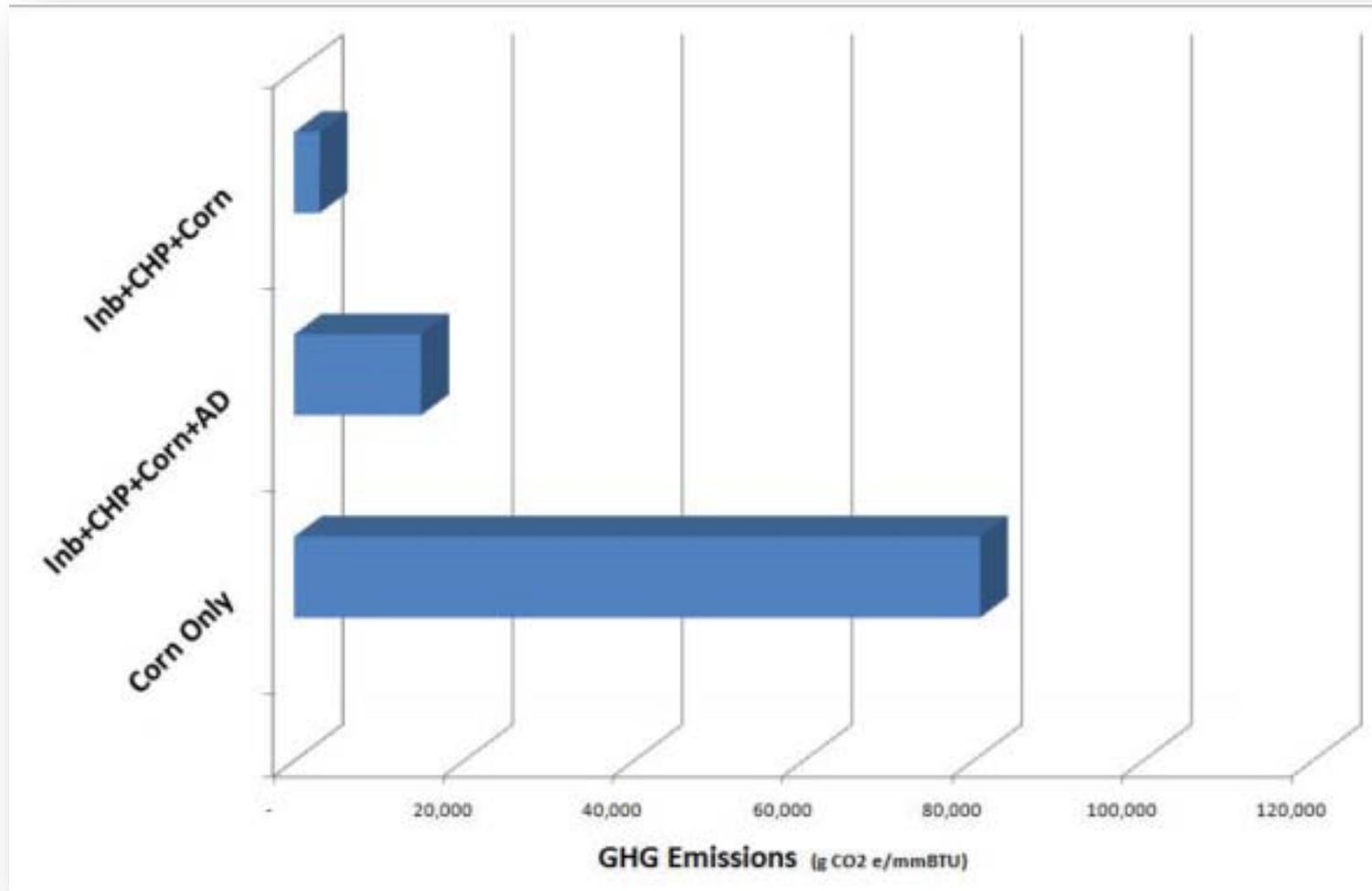
Carbon Green is one of the current grain ethanol operations reviewing integration of an Inbicon Biomass Refinery to produce lowest carbon fuel.



# Inbicon Biomass Refinery

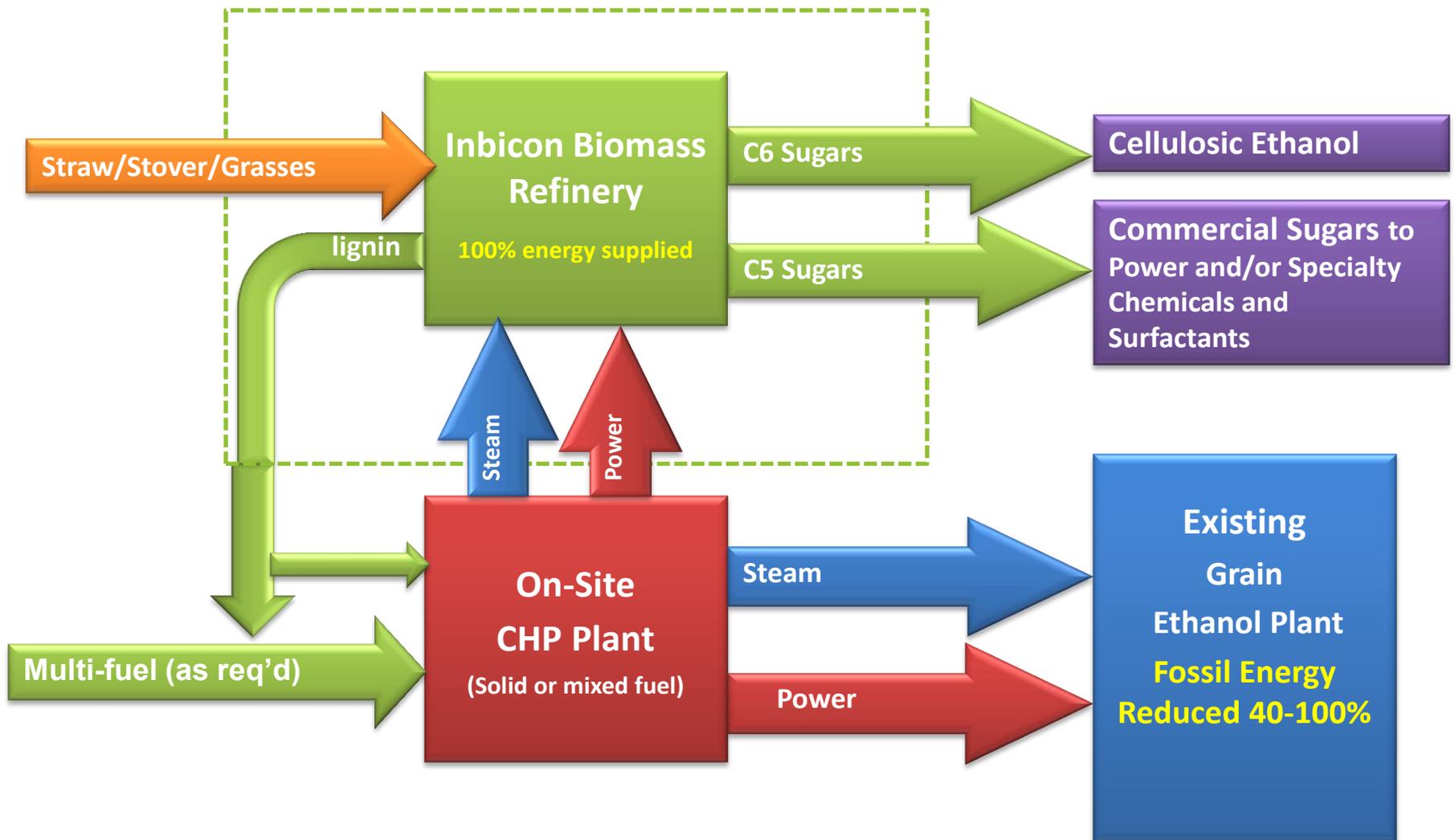
## Pathways to continuous Carbon Intensity Reduction

- Integration with grain ethanol plant achieves CARB/LCFS compliance for all ethanol produced.
- Some integrated Inbicon Biomass Refinery project platforms will be carbon negative.



# Inbicon Biomass Refinery

## Integration with a 100MMgpy grain ethanol plant



# Fair Oaks Biomass Refinery

1200Tpd corn stover / 20 mmgpycellulosic ethanol / 55 MW of green power

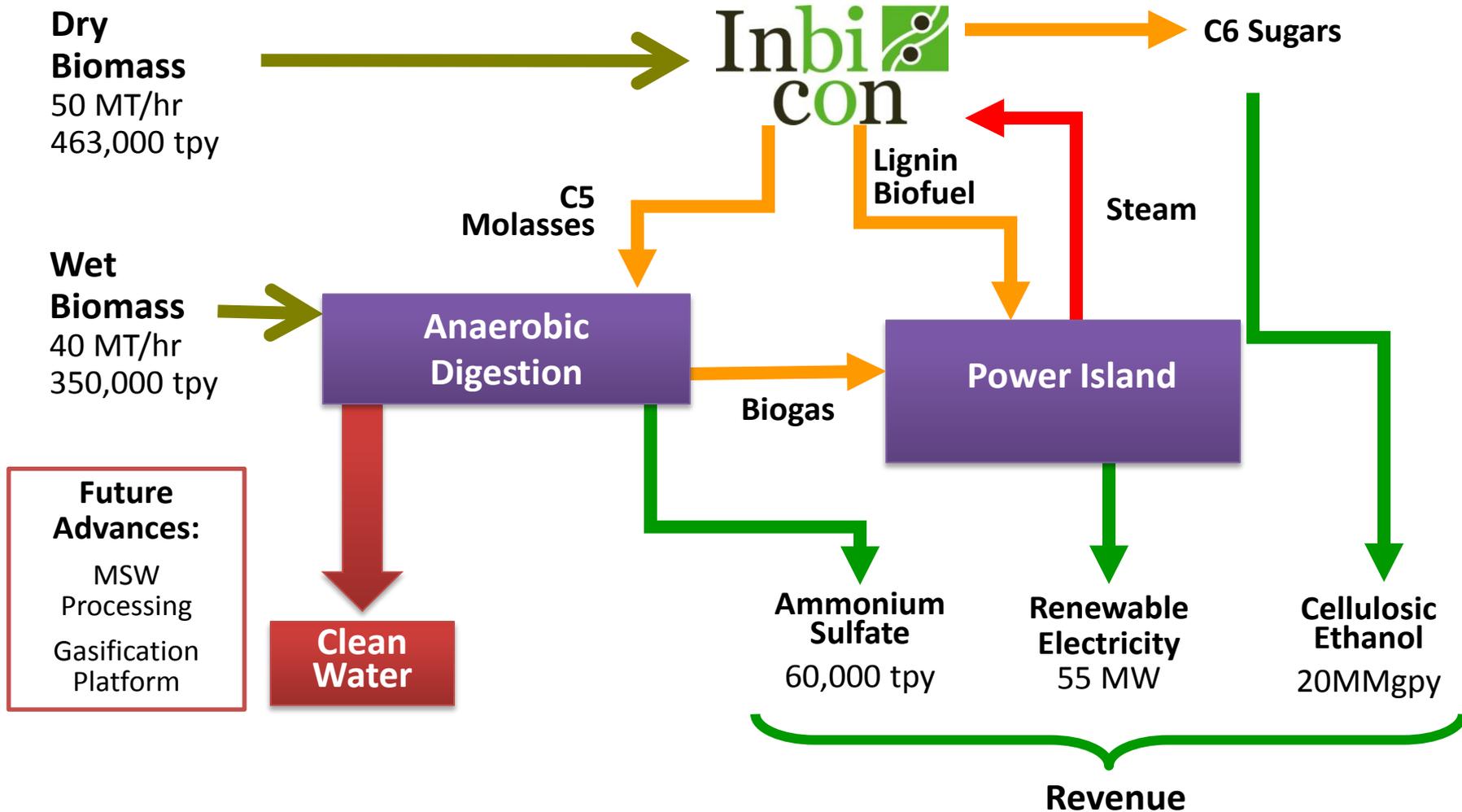


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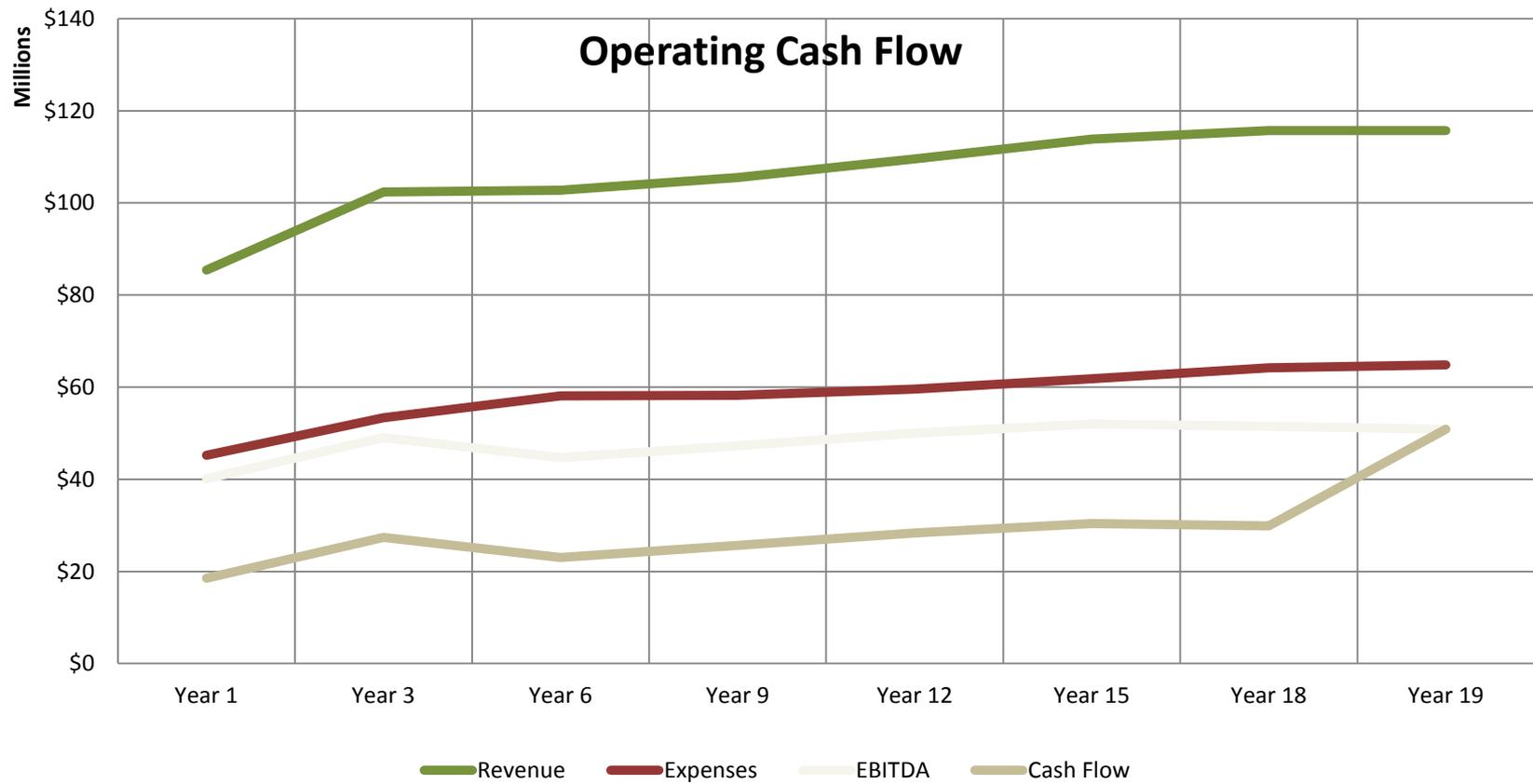


FAIR OAKS FARMS  
BIOREFINERY, LLC

One example of sustaining a profitable and sustainable platform.  
Fair Oaks Biomass Refinery is now in the FEED stage of development.



# Fair Oaks Biomass Refinery Key revenue factors



## KEY TAKEAWAYS:

- **POSITIVE** cash flow in Year 1
- **Over \$85M** revenue generated in Year 1
- **Average annual revenue >\$100M**

**Financing a new industry:  
Looking for money in all  
the right places.**

Inbicon Biomass Refinery located Maabjerg, Denmark is expected to be commissioned in 2015.







**Making ethanol work for the world.™**



Building the industry by building relationships.

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