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BIOGASDONERIGHT:

**SCALING UP BIOGAS & BIOCH₄
IN ITALY: SUCCESS STORIES**

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CIB Technology and Scientific advisory board member



OUTLINE

- Why GHGs emission & climate change matters
- What is Biogasdoneright
- Biogasdoneright carbon footprint
- Biogasdoneright scalability
- Biogasdoneright land efficiency
- Conclusions

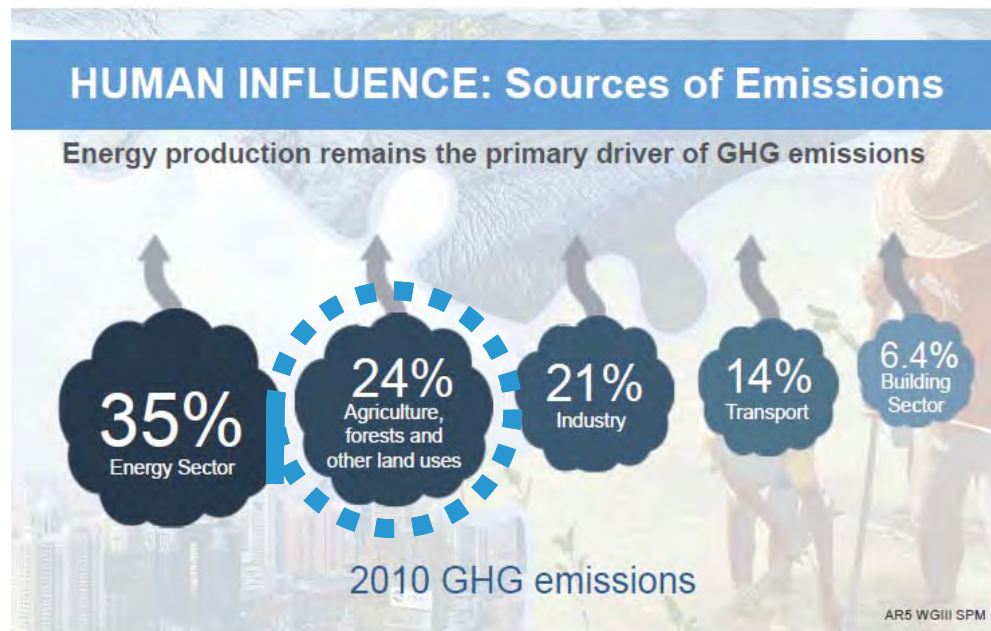
WHAT IT IS BIOGAS TODAY IN ITALY?

A success story:

- 3rd biogas sector globally
- > 7500 GWh el produced (2014)
- > 2,2 billion Nm³ bioCH₄ equivalent per year (2015)
- > 4 Billion € invested in 5 years
- 12.000 direct, qualified jobs created
- > 30 Million m³ digestate (biofertilizers) per year
- Helped farmers to avoid boom burst market cycles



IPCC MITIGATION REPORT 2014

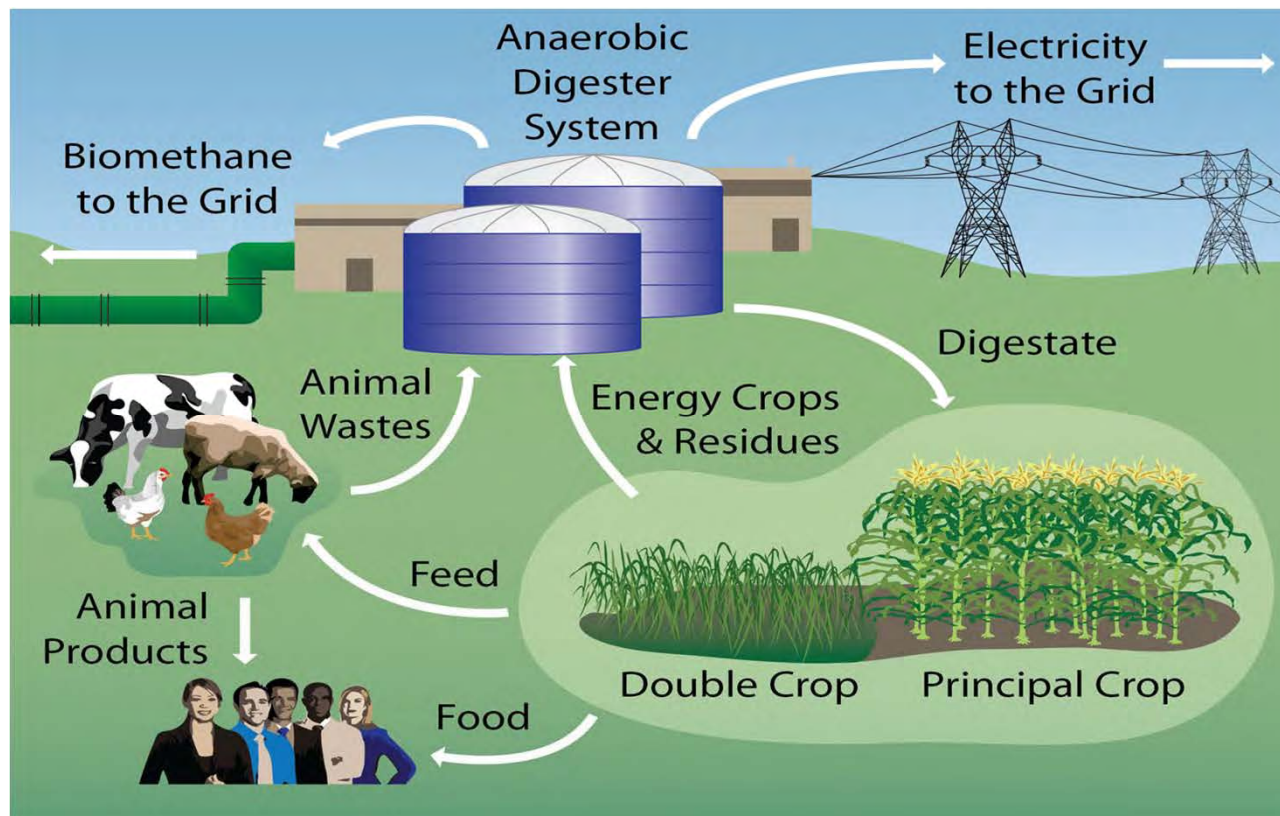


IPCC AR5 Synthesis Report

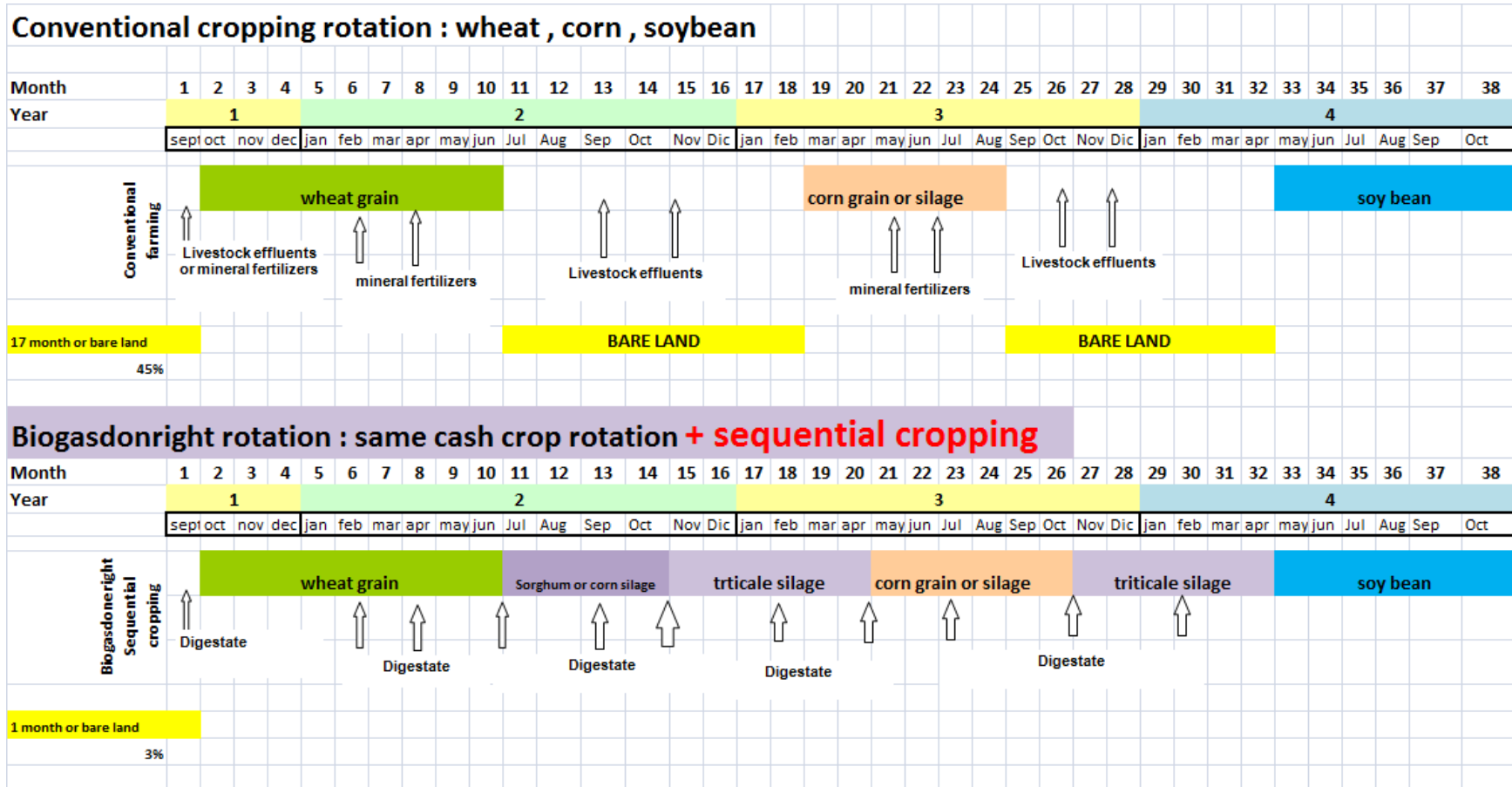
Agriculture alone is responsible for 12% of the GHGs emission globally

BIOGASDONERIGHT: PRODUCING FEED AND BIOGAS FEEDSTOCK THROUGH SEQUENTIAL CROPPING

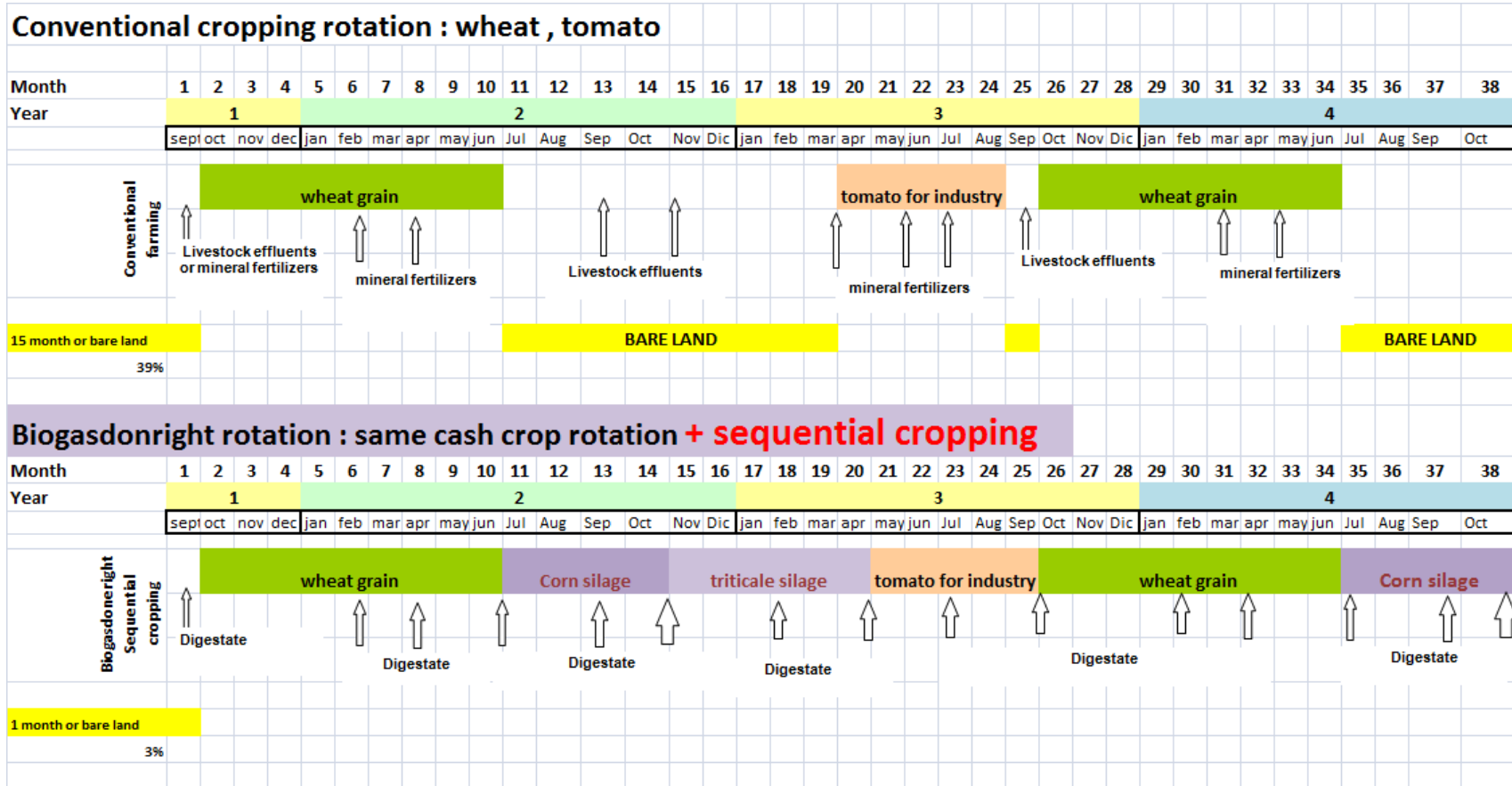
- Sequential cropping: harvesting two crops instead of one on the same field in a single year
- Nutrients being recycled back to the field through biogas digestate
- Use of byproducts, livestock effluents & side streams



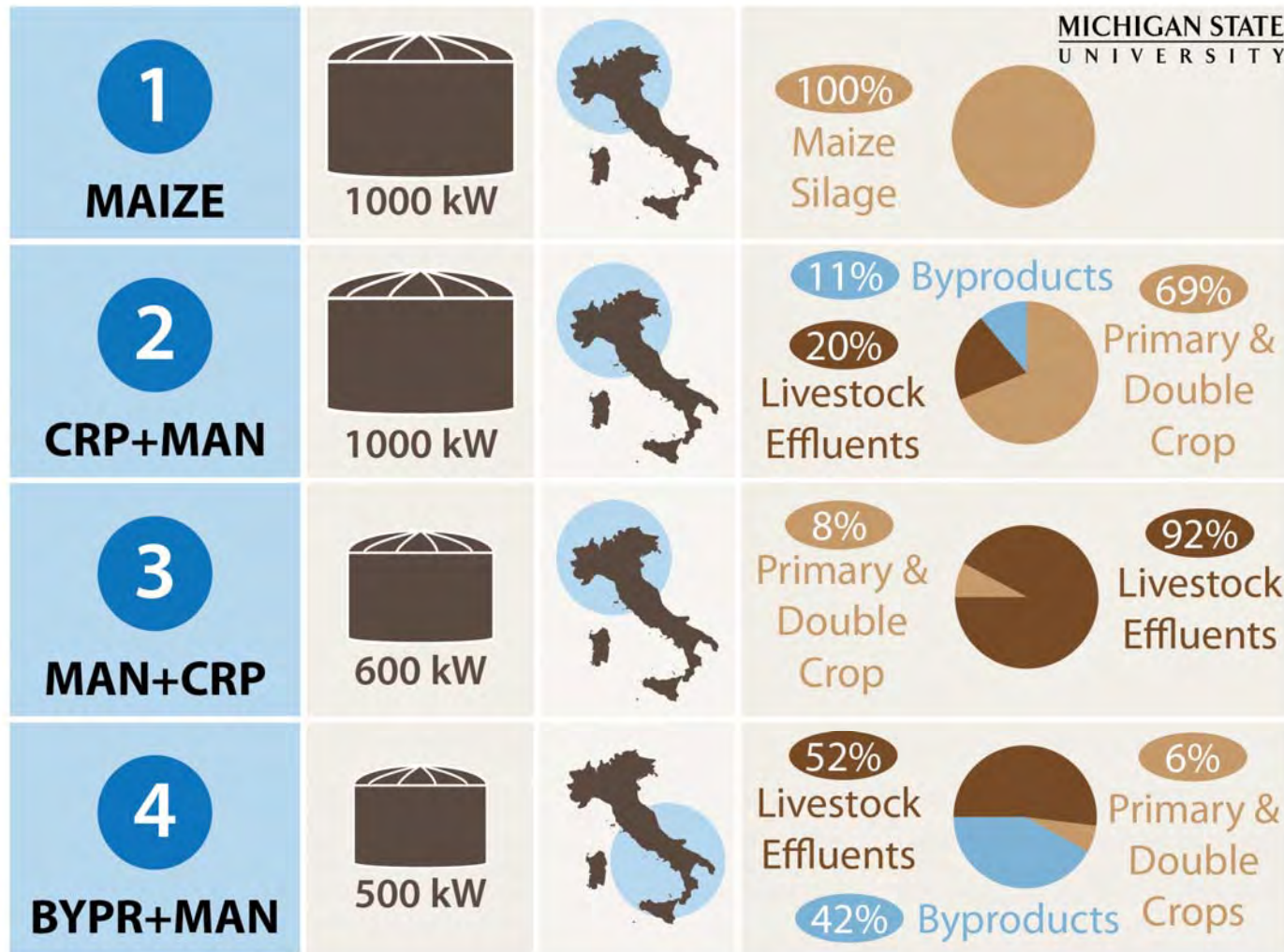
SEQUENTIAL CROPPING LAND USE



TRITICALE AND TOMATO

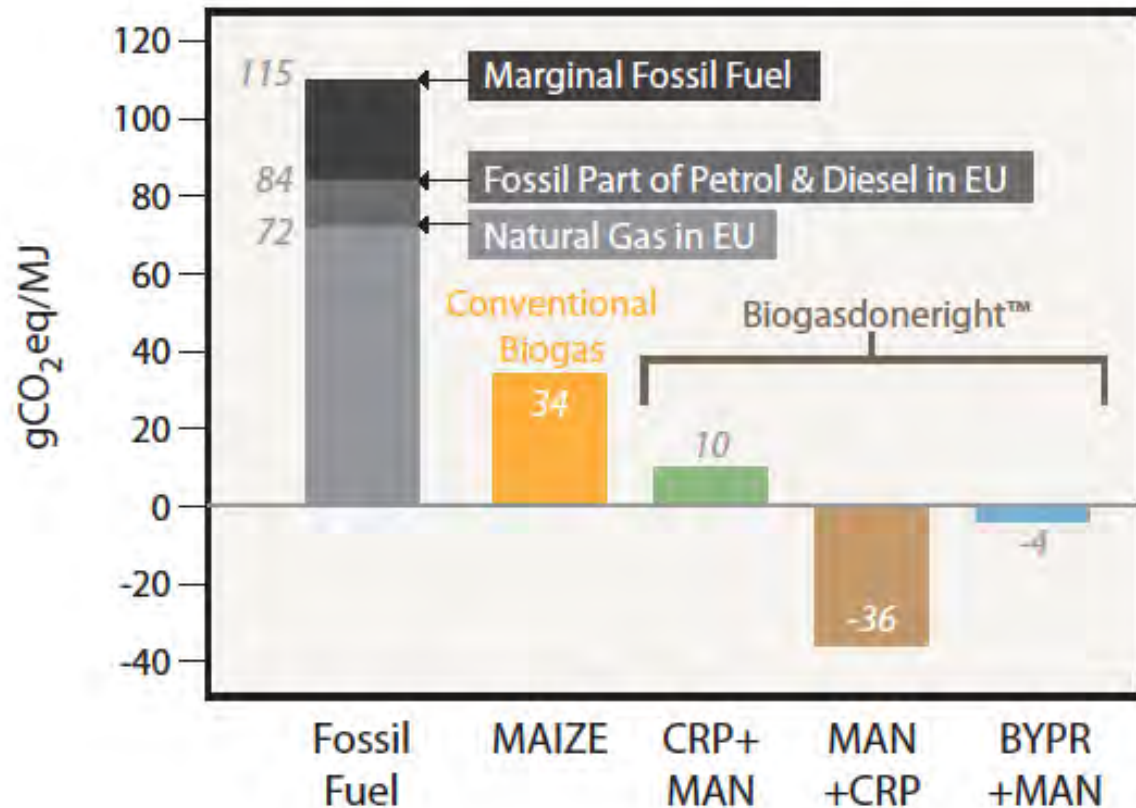


BIOGAS DONERIGHT GHG EMISSION REDUCTION POTENTIAL



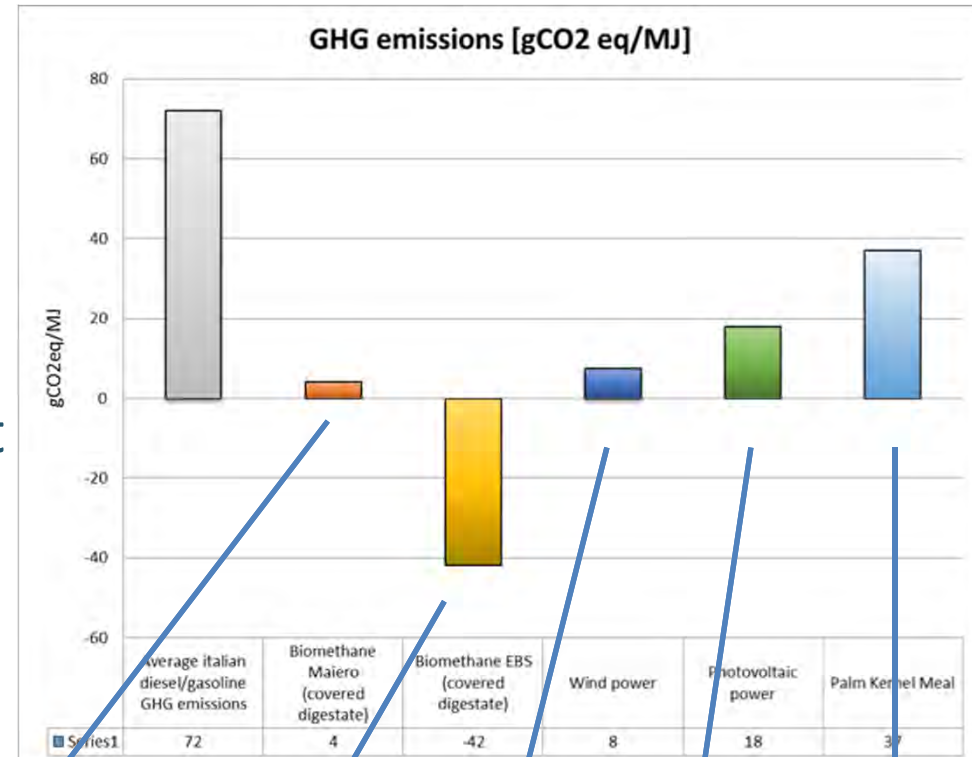
BIOGASDONERIGHT GHG EMISSION REDUCTION POTENTIAL

- Due to its
 - biogas conversion efficiency,
 - modification of farming practices
 - Kind of biomass utilized
- Biogasdoneright has a more favourable carbon footprint compared to other bioenergies or renewable energies
- It's able to create a
 - **Carbon negative bioenergy system**
 - **And at the same time it improves the Food Security**



WHAT ABOUT BIOGASDONERIGHT LCA?

- Better LCA among renewables
- Better LCA among biofuels
- Best option to lower Carbon footprint transport sector
- Toward Carbon negative agriculture!



BDR DOUBLE CROPPING

BDR AGROWASTES

WIND

PV

PALM OIL DIESEL



BIOGASDONERIGHT IS HIGHLY EFFICIENT AND EASILY SCALABLE

- Biomethane is the key for the future energy mix
- Renewable and sustainable
- Flexible, programmable
- Allows integration Gas and electricity grid
- With Power to Gas stabilizes the electricity grid
- Target for 2030: 8 billions Nm³ BioCH₄/year with an ecological agricultural intensification

Biomethane development and the decarbonisation strategy in Italy

Position Paper of Consorzio Italiano Biogas - Snam - Confagricoltura for COP 21 - Paris



The fundamental role of biomethane in the Italian energy transition

The Consorzio Italiano Biogas, Snam S.p.A. and Confagricoltura share the vision of a fundamental role for biomethane in the Italian strategy for fighting climate change and for an energy transition towards a low-carbon economy based on sustainability and circularity in the use of scarce resources.

This vision is based on specific elements that characterize the biomethane production and utilization value chain.

Biomethane is an energy source that is:

- **renewable**, because it is produced from biomass of agricultural origin that are renewed over time and can be virtually inexhaustible;
- **sustainable**, because biomasses in their lifetime have incorporated carbon that is contained in the atmosphere: its consumption does not release the carbon sequestered in fossil sources fields, with almost no additional greenhouse gas emissions; and, if produced according to the principles of "biogas done right"¹, it helps to significantly reduce emissions in the agricultural sector, where they account for over 14% of total emissions² (in Italy 7%); because its production can take place while preserving biodiversity and the carbon storage function performed by forests and farmlands.

Its use can take place in a way that is:

- **flexible**, because it can be used in every energy uses, from the production of heat and cold to the generation of electricity, and as a fuel in the transport sector; it can even become a raw material for the production of biomaterials and biochemicals;

¹ See for instance "Biogasdoneight and soil carbon sequestration" www.consorziobiogas.it

² IPCC Mitigation Report, April 2014

[Link](#)



ITALIAN BIOGAS PRODUCTION PLAN 2030

8 + 2 = 10 Billion Nm³ CH₄ bio

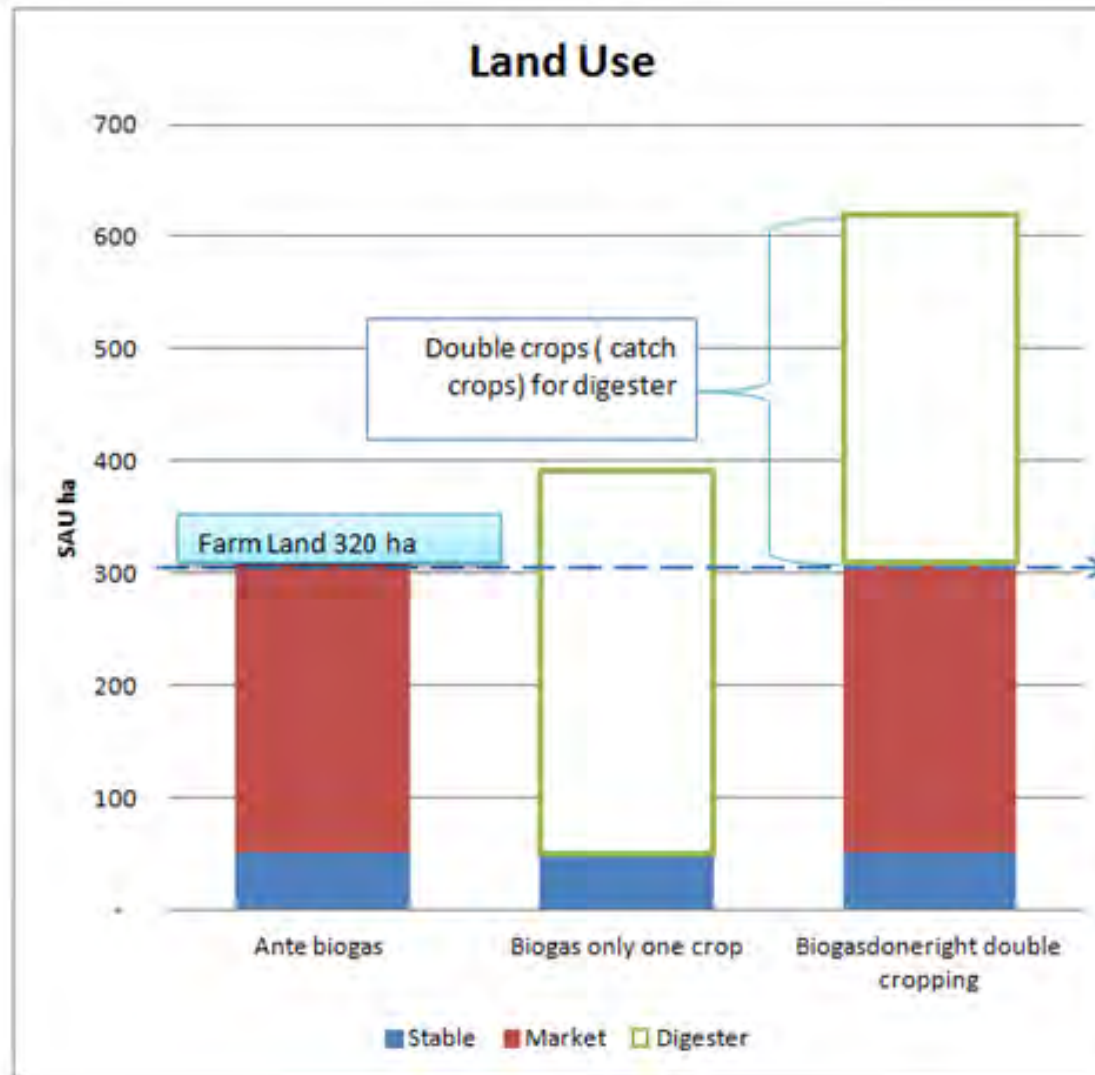
- 10 B Nm³
 - 3 B Nm³ from monocrops **3%** of Italian row crop land
 - 2,5 B Nm³ from sequential cropping
 - 2,5 Nm³ from livestock effluents
 - 2B Nm³ from Organic wastes
- 10x more the current NG use as transport fuel
- 15% current Italian NG consumption
- **Average family of three CH₄ demand= 3000 Nm³/year → sufficient to cover > 3,3 million families (1/6th of Italian families)**

Consorzio Italiano Biogas Italian biogas production plan 2030

		2010	2015	2020	2025	2030
Biometano totale	(Gm ³ /anno)	0,70	2,20	4,20	5,50	8,00
- SAU	(ha)	85.000	200.000	250.000	300.000	400.000
- SAU	(ha/Mm ³ CH ₄)	121	91	60	55	50
- Resa primo raccolto	(m ³ /ha di CH ₄)	6720	6720	6720	6720	6720
LAND EFFICIENCY	(m ³ /ha di CH ₄)	8.235	11.000	16.800	18.333	20.000
- Biometano da primo raccolto	(Gm ³ /anno)	0,57	1,34	1,68	2,02	2,69
- Biometano da biomasse di integrazione	(Gm ³ /anno)	0,13	0,86	2,52	3,48	5,31
<i>di cui colture di integrazioni</i>	(Gm ³ /anno)	0,00	0,36	1,52	1,73	2,65
<i>di cui biomasse residuali</i>	(Gm ³ /anno)	0,13	0,50	1,00	1,75	2,66
- Biometano da primo raccolto	(%)	82%	61%	40%	37%	34%
- Biometano da biomasse di integrazione	(%)	18%	39%	60%	63%	66%

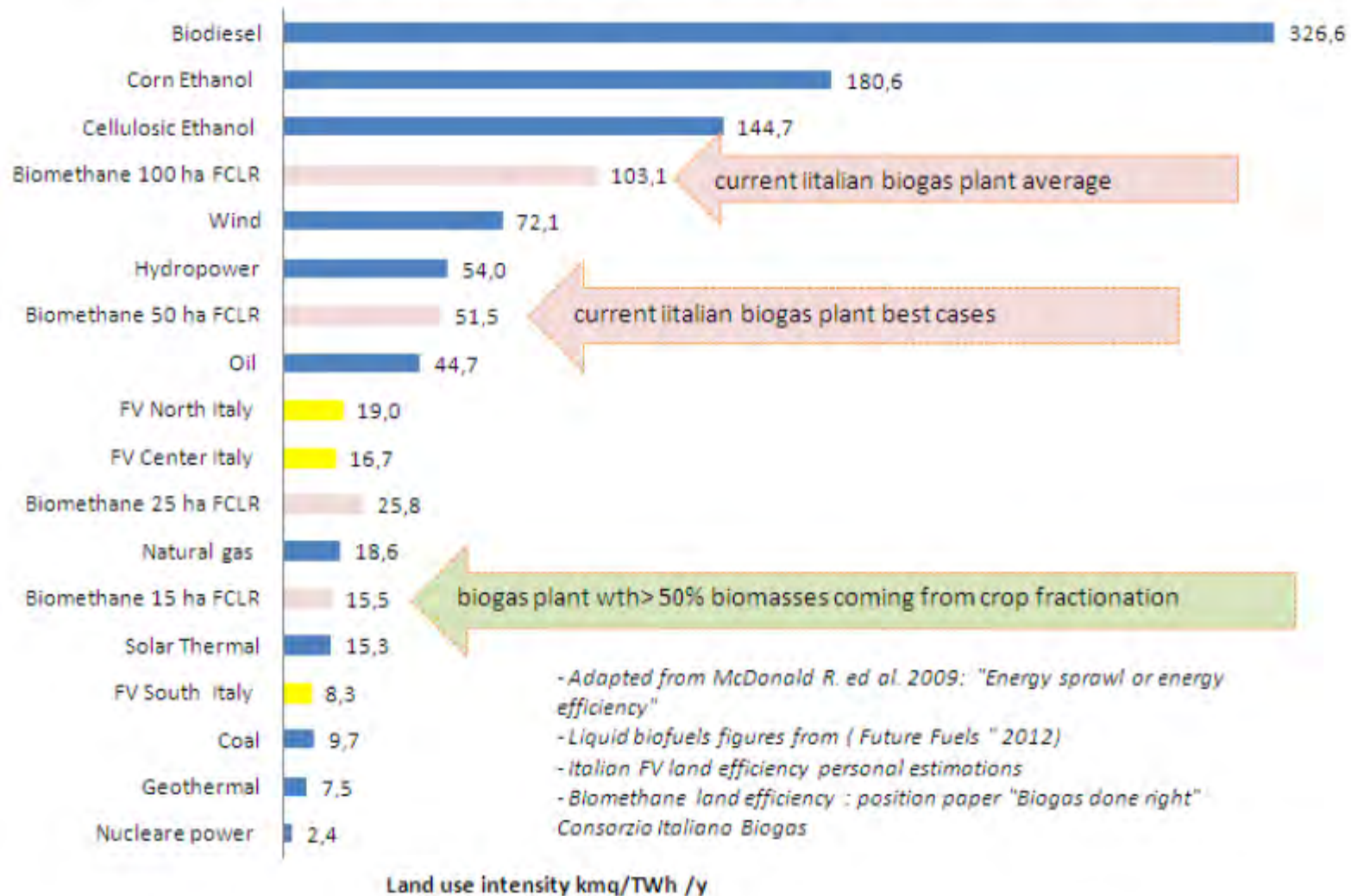
La potenza installata del biogas agricolo dovrebbe ammontare a circa 1.000 MWe, pari ad una produzione lorda di circa 2,1 Mrd di Nmc

Effects on land use



Land intensity Biogasdone right

Land-use intensity for energy production/conservation techniques



- Biogasdoneright is an olistic approach that turn agriculture into a solution and not anymore a problem
- Bioelectricity is dispatchable power available 24/7
- Biomethane in the gas grid will lower emissions related to natural gas use and its production will not be neglectable
- If Italy, with one of the worst inhabitant/agricultural land ratio did it, the system is scalable

CONCLUSIONS



Example of Biogasdoneright in action: Cooperativa La Torre: 2 biogas plants of 1 MW electric each.
Daily input: 90 tons cow manure, 90 tons cow slurries, 38 tons eggs laying chicken manure, 10 tons rabbit manure, 5 tons spent mushrooms litter, 10 tons sugar beets, 30 tons corn silage, 5 tons rye grass (all wet weights)
Daily output (energy): 48 MWh el



THANK YOU ALL FOR YOUR ATTENTION!





CONTACTS AND FURTHER READINGS

<https://www.consorziobiogas.it/pubblicazioni/>

CIB

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BIOGASDONERIGHT®

ANAEROBIC DIGESTION AND SOIL CARBON SEQUESTRATION
A SUSTAINABLE, LOW COST, RELIABLE AND WIN WIN BECCS SOLUTION

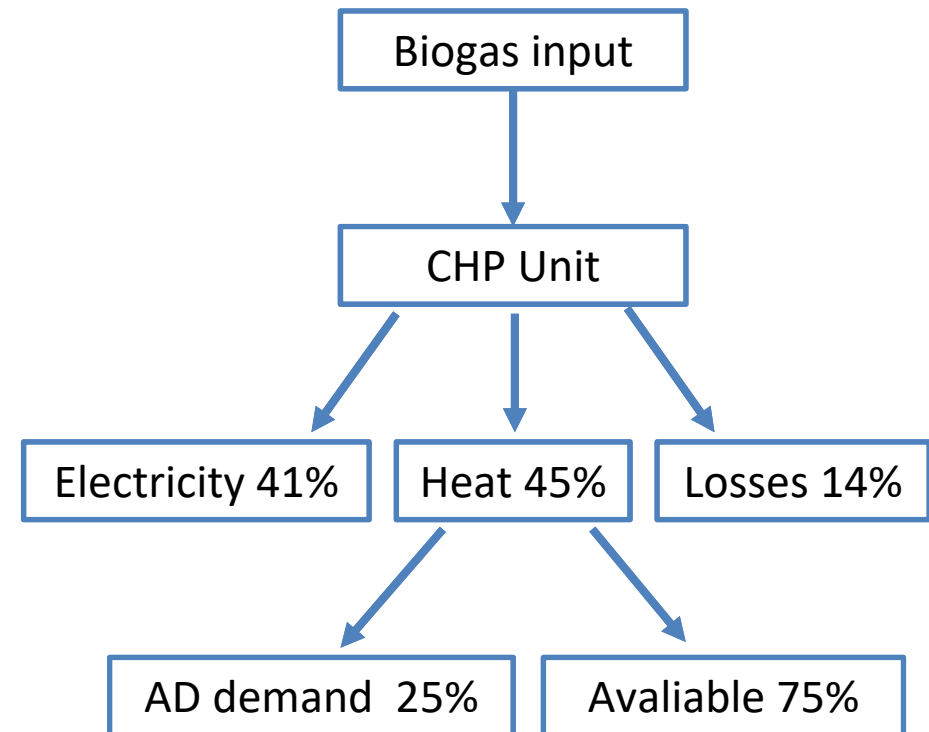


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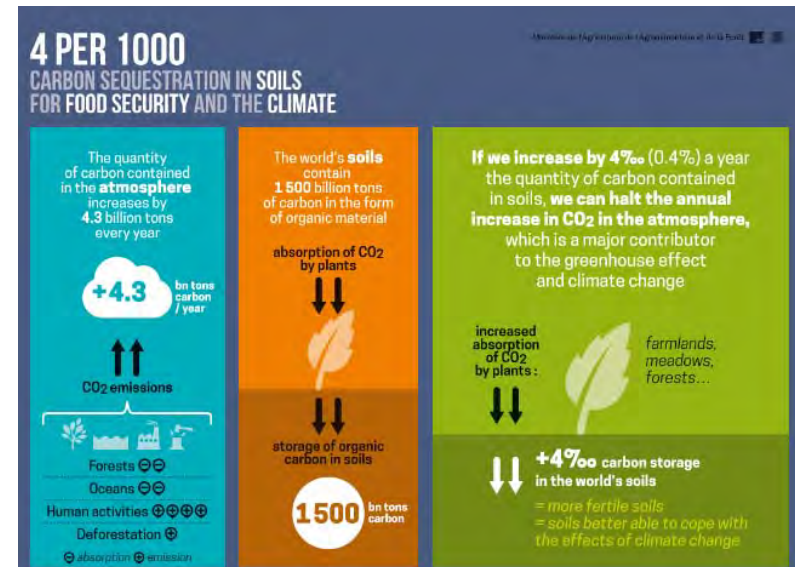
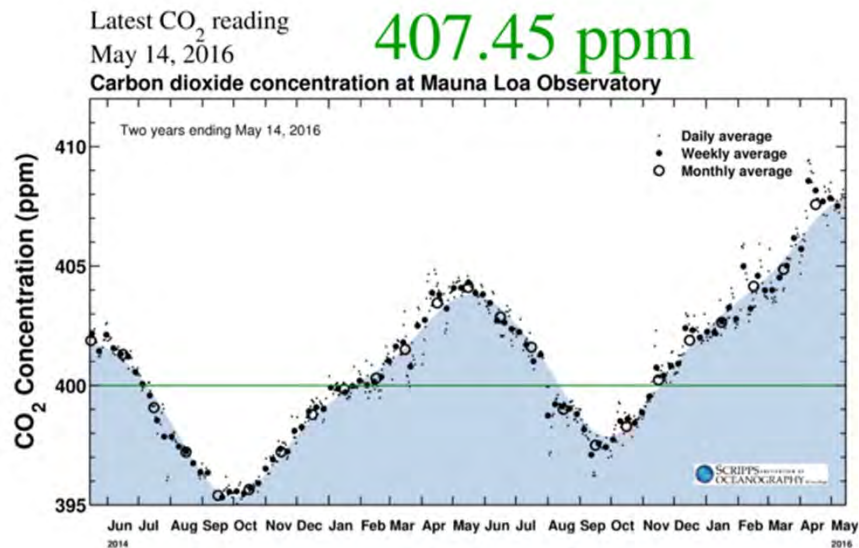
CHP: HEAT ALSO AVAILABLE AS BY PRODUCT...

Rule of thumb: 1 MW el output AD plant in CHP

Biogas energy	MW
Total energy content	2,4
Electricity output	1
Heat output	1,1
AD consumption	0,28
Available	0,82



WE MUST PRODUCE MORE IN AGRICULTURE, WITHOUT INCREASING GHG EMISSIONS , INCREASING PHOTOSYNTHESIS AND STORING CARBON IN SOIL



We need carbon negative systems and soil is the most abundant, cheap sink for carbon. Moreover, more carbon in soil fights climate change at local level and increased food security

Trajectory cost

