INTRODUCTION: Anaerobic Digestion (AD) is recognized as one of most viable way to produce renewable electricity (EE). In Italy, in the last 20 years, thanks to a favourable subsidy framework, around 1800 AD plants fed with agricultural feedstock were built. Despite the higher supply cost, due to the level of subsidy (280 €/MWh of EE for plants built before the 2013), several plants are fed mainly with cereal silage. The future scenarios of bioenergy production could change considerably when the incentives will cease.

AIM OF THE STUDY: To analyse the consequences related to a change in the actual subsidy framework and, in particular, the elimination of the grants for biogas production from cereal crops. A consequential life cycle assessment (cLCA) was performed.

RESULTS AND DISCUSSION - Respect to BS (current Italian production of EE from agricultural AD plants thanks to the actual public subsidies):
- FS1 involves an impact reduction for all the impact categories affected by cereal cultivation and, in particular, for particulate matter (-77%) acidification (-134%) and eutrophication (-191% terrestrial and -97% marine). Moreover, the higher content of NH$_3$ in the digestate reduce the use of mineral N fertilisers. Finally, the offsetting of the reduced of EE production through non-renewable fossil sources does not affect considerably the performances of FS1.
- FS2, due to the total substitution of EE from biogas with non-renewable energy sources, shows worst environmental performances in all impact categories (10/12) except human toxicity (non-cancer effects) and marine eutrophication. For climate change, the worsening of the impact is related to the slurry storage in open tanks that takes place instead of the AD. In fact, the ‘traditional storage involves higher emission of CH$_4$, N$_2$O and NH$_3$. Furthermore, the smaller availability of nitrogen (in the animal slurry respect to digestate) requires an a supplemental consumption of N fertilisers (Urea) respect FS1 and BS.

CONCLUSIONS - The achieved results can support the decision of policy makers in order to drive the future towards more sustainable direction. Future activities will involve further future scenarios evaluated using a partial equilibrium model.

 Baseline and future scenarios considered (EE = electricity, CHP = combine heat and power).

**Baseline**

- LAND OCCUPATION: CEREAL CULTIVATION, MILK, COW, CALVES
- CEREAL IMPORT FOR FEEDING
- CEREAL SILAGE
- MILK, COW, CALVES
- FERTILISATION
- AD
- CEREAL CULTIVATION
- ANIMAL SLURRY
- MILK, COW, CALVES

**FS1**

- LAND OCCUPATION: CEREAL CULTIVATION
- CEREAL IMPORT FOR FEEDING
- CEREAL SILAGE
- MILK, COW, CALVES
- FERTILISATION
- AD
- CEREAL CULTIVATION
- ANIMAL SLURRY
- MILK, COW, CALVES

**FS2**

- LAND OCCUPATION: CEREAL CULTIVATION
- CEREAL IMPORT FOR FEEDING
- CEREAL SILAGE
- MILK, COW, CALVES
- FERTILISATION
- AD
- CEREAL CULTIVATION
- ANIMAL SLURRY
- MILK, COW, CALVES