



**Precision Agriculture: EGNOS helping farmers to
reduce costs and environmental impact**

Technology overview

Efficient and sustainable farming solutions are needed now more than ever, as competition in the agriculture industry continues to increase and production costs have to be considered very carefully. Precision agriculture is a highly effective farming strategy that allows farmers to better allocate inputs (e.g. seeds and fertilisers) and increase productivity, while lowering costs and minimising environmental impact. Traditionally, the main obstacle to wide scale application of precision agriculture has been the substantial investment in equipment and services necessary to implement these methods and to obtain concrete results. Now, the EGNOS Open Service has fundamentally changed the equation by offering high precision at low cost.

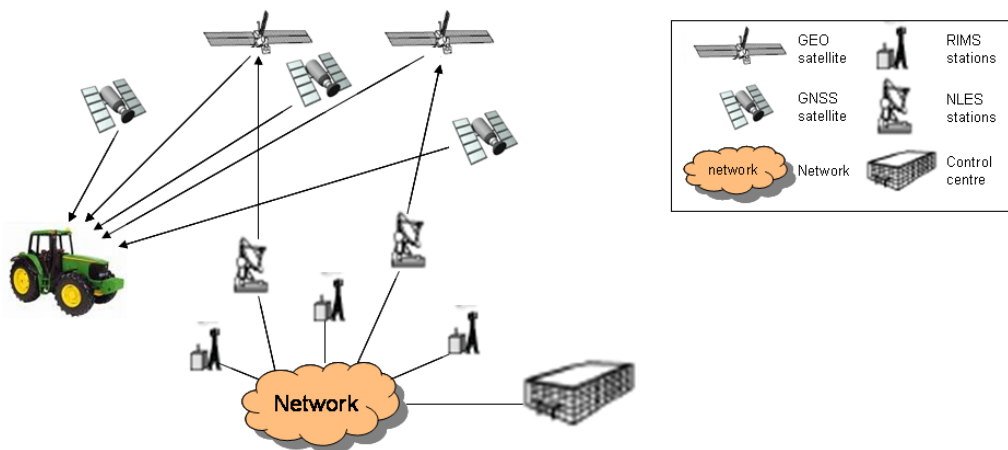


Figure 1. EGNOS system architecture.

There are two main categories of solutions based on global navigation satellite system (GNSS) in the agriculture sector:

- *Low-technology GNSS solutions* are used for low-value crop cultivation (e.g. cereals), low accuracy operations (e.g. fertilising and reaping) and for agro-logistic applications (e.g. land parcel identification and yield mapping). Most of these techniques rely on standard GNSS receivers complemented by free satellite-based augmentation services such as WAAS in the US and EGNOS in Europe. The level of accuracy achieved is below 1 meter, while pass-to-pass accuracy is +/- 15–30 cm.
- *High-technology GNSS solutions* are more costly and are typically used for high-value crop cultivation (e.g. potatoes and vegetables) or precision operations (sowing and transplanting). More advanced positioning technologies, such as local and regional Real Time Kinematics (RTK) systems or commercial satellite-based augmentation services (e.g. Omnistar and StarFire) are used. The levels of accuracy achieved are in the range of 2-10 cm with a pass-to-pass accuracy of +/- 2–3 cm.

Benefits of GNSS in agriculture

The main advantages of GNSS technologies in agriculture include accuracy (higher than what a human alone can achieve) and repeatability of the same action year after year, thanks to the ability to record data. These two fundamental advantages lead, in turn, to valuable benefits from the farmer's perspective:

- Reduction of waste and over-application of fertilisers and herbicides;
- Reduced seed consumption;
- Fuel savings;
- Time savings;
- Reduced fatigue;
- Extended equipment life due to an optimised usage;
- Optimisation of crop yields.

According to recent studies in Australia, where 10-15% of grain growers already use GNSS for machine guidance, the use of GNSS has resulted in fuel and oil cost reductions of 52% and labour cost cuts of 67%.

However, these techniques do have some limitations for farmers in Europe in particular, mainly due to smaller field size (ten times smaller on average than in the US), requiring more accurate navigation. The emergence of new methods, such as automated planting and harvesting, also requires more precise measurement. Also, consumer demands for organic foods and environmental protection have led to a need to reduce chemical use.

In order to overcome the limitations of GPS, manufacturers of precision agriculture systems have integrated satellite-based augmentation systems (SBAS) to correct GPS measurements. EGNOS, the European SBAS, offers farmers a free Open Service, increasing the accuracy and integrity of existing satellite positioning signals to about 1-2 m. In precision agriculture, this means a pass-to-pass accuracy of around 20 cm. EGNOS-based devices allow farmers a higher return with minimum investment:

- Tractor guidance with improved precision;
- Automated variable ploughing, seeding and spraying;
- Virtual fencing and livestock positioning;
- Easy and accurate field measurement and boundary mapping.

The research project 'FieldFact', co-funded by the European Commission under the Sixth Framework Programme, has demonstrated that EGNOS-enabled equipment can help farmers achieve a more homogeneous crop quality. EGNOS allows farmers to adapt the spacing of a given crop according to the soil clay content of a particular area, and the end result is a higher commercial return.

In other applications, such as automated hoeing, EGNOS can reduce the amount of labour needed for organic farming by up to a 30%, FieldFact indicated. Moreover, by providing a verifiable means of documenting the parcel of land on which a crop was grown, EGNOS can help farmers respond to the increasing demand for traceability among consumers and food regulators.

Market Penetration of GNSS solutions

Recent years have shown an increasing demand among farmers for GNSS-enabled tractors. Although relatively small (less than 1% of the global core GNSS shipments market), the agriculture sector is one of the most interesting, mainly due to the fast pace of penetration of this technology. In 2009, about 8% of new tractors sold in Europe were equipped with GNSS receivers and this percentage is expected to increase to 13% by 2012.

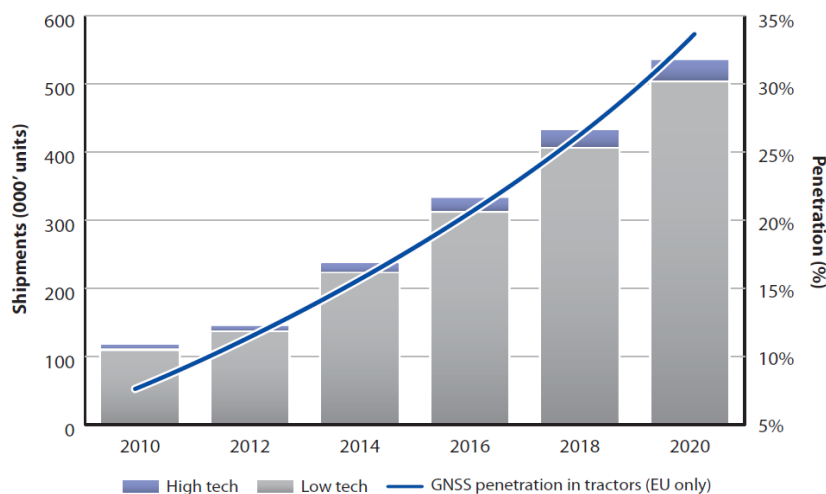


Figure 2. Shipments (thousands of units) and penetration (%) of installed GNSS devices worldwide in the agriculture sector.

Another key advantage of EGNOS, of course, is that it is absolutely free. For farmers, this means no installation of new hardware on farms and no ongoing subscription costs as is the case with other existing satellite navigation augmentation systems.

At the same time, the retrofitting of existing tractors with GNSS receivers involves about 4% of the European fleet. Because tractors have a long lifetime, the retrofitting market is expected to continue to grow for some years, at an estimated rate of 12% per year.

In 2012, about 240 000 tractors across Europe are likely to be equipped with a GNSS-enabled receiver. Thus, everything is in place for even wider penetration of GPS-based solutions in farming. According to some industry experts, in four to five years it will be standard equipment on all farm tractors and combine harvesters.

Many agriculture machine manufactures and farming operations systems suppliers have already successfully implemented and commercialised EGNOS-based solutions. The CLAAS Agrosystems business case stands as an example of the successful integration of the EGNOS augmentation service. CLAAS Agrosystems specialises in software and machinery for precision farming operations and is an early EGNOS adopter.

According to a cost and benefits analysis commissioned by the European GNSS Agency (GSA), EGNOS delivered positive benefits starting from less than 20 hectares of cultivation of soft and durum wheat, corn and barley. In Europe, where the average farm size is 16 hectares, EGNOS could therefore represent the best technology for small and medium-sized farms, especially with its low implementation cost.

Related Documents

1. Brochure - [EGNOS for Agriculture](#)
2. Presentation - '[EGNOS: becoming the preferred GNSS technology in European Agriculture](#)'
3. Leaflet - [EGNOS for Agriculture](#)
4. Advertisement - EGNOS for Agriculture - [UK](#) | [FR](#) | [DE](#) | [IT](#)

Related Video

- [EGNOS in Agriculture](#)

More Information

- [FieldFact project: Harvesting EGNOS and Galileo for use in agriculture](#)
- [Economic Benefits of Precise Positioning, Matt Higgins, President IGnSS Society, Australia](#)
- [GNSS Market report 2010](#)