Abstract
One major challenge for the CCS is to understand if CO₂ geological storage could be implemented at the scale of the climate change issue.

Objective of the article is to present preliminary assessment of the CO2 capacity of Appalachian Basin.

In 2017, the Storage Resource Management System (SRMS) was developed by the Society of Petroleum Engineers (SPE) with the support of the Oil and Gas Climate Initiative (OGCI) CO₂ storage workgroup. SRMS is based on the concepts of the Petroleum Resource Management System (PRMS), also developed by the SPE, which provides a classification framework for oil & gas resources and reserves. The SRMS provides guidelines on how to classify CO₂ storage resources within various storage categories. It is done based on the assessment level of confidence and maturity of the assessment. It also provides guidelines on how assess mature storage resources capacity, increasing its chance of commerciality and ultimately allow for operational deployment of CO₂ geological storage.
The Appalachian Basin is a mature basin that contains oil, gas and coal resources and extends over an area of 50,000 km². Despite it is well known for the reserves, it has been studied as a potential CO₂ storage system. It is identified as one of the largest storage systems in North America. The basin was extensively exploited causing a large number of wells especially on Marcellus asset. For the volumetric estimation of CO₂ sequestration, several formations were studied, especially Oriskany sandstone and Medina and Tuscarora Sandstone. Some of the analyses are probabilistic using stochastic variables in a Montecarlo method to determine the uncertainty in the storage volume.

The result of the review is that the Appalachian basin storage resources remain prospective resources, in the Play subcategory. An important point to be considered is to evaluate and quantify the storage capacity of the shales of this basin. Indeed it is known that organic rich shales desorb methane while adsorbing CO₂. Experiments performed in Marcellus shale show that those shale can adsorb 4 times more CO₂ than Methane. Consequently if all of the methane absorbed for the shale could be displaced by CO₂ the additional capacity of the shale could be of approximately 50 Gt. Engineering studies need to be performed in order to verify this numbers.

Two issues that can affect the storage capacity are: CO₂ migration through connexion of shallow formation and the number of wells performed in the basin that can condition the injection strategy or the seal between formation.

The complexity of the basin is important with a fractured system. Several studies affirm that there are evidences of migrations from Marcellus formation to shallow aquifers. These evidences are recorded in the NE of Pennsylvania and the mechanics of migration are inferred faults. Gravity data suggest that some of these structures can possibly extended to the basement.

Some shales like Marcellus were used as a cap-rock and these well that are crossing the cap-rock can be a potential conduits for the CO₂ injected. Also they will determine the placement of the injection well for CO₂.

Recommendations are finally provided in order to ensure compatibility with SRMS.