The DOE is requested how it assessed the conversion factor of 7.14 kg wood per kg charcoal from study "Wood fuel consumption in Maputo, Mozambique" published in 2004, for the calculation of parameter Bold (Quantity of woody biomass used in the absence of the project activity in tonnes of wood), as: (i) it remains unclear how the study for city of Maputo is applicable for a CPA in city of Pemba and how the DOE concluded that the production procedures of charcoal are similar all over the country; (ii) the study "Mozambique Biomass Energy Strategy" (2012) used by DOE/CME to support the use of conversion factor 7.14, in section 4.7.1.4 mentions that out of one ton of wood only 150 kg of charcoal is recuperated, representing a conversion factor of 6.67 kg wood per kg charcoal, and is more recent than the study used by CPA 9981-0003.

Response by CME	Validation opinion of DOE dated 5th June 2019
i)How the study for city of Maputo is applicable for a CPA in city of Pemba and how the DOE concluded that the production procedures of charcoal are similar all over the country? CME wants to clarify that the conversion factor of 7.14 of the peer reviewed study "Wood fuel consumption in Maputo, Mozambique" (Document 3. Brouwer and Falcao, 2004) is referring to the charcoal production made in the rural areas sourcing charcoal for the city of Maputo and not within the city of Maputo. In fact, it's a common practice in Mozambique that the charcoal is produced in rural areas and transported from there to more urbanized areas. The transportation distances of charcoal may be long and can reach also 500-600 kilometres (Document 5. Luz, et al. 2015, Document 8. Mozambique Biomass Energy Strategy, 2012).	The verification team has reviewed the peer reviewed study "Wood fuel consumption in Maputo, Mozambique" and confirmed that charcoal is produced in areas around Maputo from where transported to the urban areas of Maputo. The verification team confirmed that the same situation is valid also in Pemba where charcoal is transported from rural areas to urbanized areas like Pemba. As per the documents reviewed, in the southern part the transportation distances are max. 500-600 km (Luz, et al. 2015 and Mozambique Biomass Energy Strategy, 2012). Instead in the North of the country the transportation distances are a bit shorter but the production is however always made in rural areas and then transported to the cities like Pemba. As per the study of Zorrilla-Miras (2018) (Document 9) "Environmental Conservation and Social Benefits of Charcoal Production in Mozambique", the following is observed. "In Mozambique, 15% of the population participates in the charcoal market (Cuvilas et al., 2010), which is estimated to have an annual value of 250 million USD (EUEI/GIZ, 2012). Around 70–80% of the urban population uses charcoal as primary energy source and demand is rising with rapid urban population growth (Brouwer and Falcão, 2004; IEA, 2014; Peter and Sander, 2009). Consequent woodland depletion results in a shifting charcoal production frontier that rapidly extends into more remote areas (Luz et al., 2015; SEI, 2002). Charcoal production in Mozambique is affected by a range of factors that apply to most sub-Saharan countries. Policy effectiveness suffers from limited institutional cooperation, integration and coordination between related sectors (Kwaschik, 2008; Zulu and Richardson, 2013). At the same time, the government lacks capacity for effective legislation implementation and enforcement (Kwaschik, 2008, Zulu and Richardson, 2013)." The interviewed local charcoal authority DPTADER-CD (Cabo Delgado Provincial Directorate of Land, Environment and Rural Development; Contact person "Head of Serviços Provinciais de Florestas e Fauna Bravia at DPTADER" Reinaldo Germano) confirmed that the only currently used charcoal production method is the use of traditional earth kilns which is the principal method in all Mozambique.

	Moreover, he confirmed also that most of the charcoal production in the area around Pemba is made without any official licences. As the charcoal production activities around Pemba are made without official licences and using the traditional earth kilns it is reasonable to assume that the conversion factor of 7.14 found for the rural areas around Maputo is equally valid for the rural production areas around Pemba. The local authority, based on the experience, also agreed that since the conditions like climate, vegetation prevailing in Maputo and Pemba is similar; the conversion ratio of 7.14 can also be applied to Pemba as well.
Moreover, charcoal production continues to be made in all over Mozambique using mainly traditional inefficient earth kilns as evidenced by the recent reports of Martins (Document 6. 2016) and Anastassov (Document 2. 2014). The production technology used in the Province of Gabo Delgado, in which the city of Pemba is located, is also described in the field study of Abiodes (Document 1. 2009) which included vising 15 and interviewing 29 charcoal producers in the rural areas and concluded that the used charcoal production method traditional earth kilns having a low wood-to-charcoal efficiency, for example, because kilns were lacking ventilation holes. Moreover, the charcoal sector is also highly informal, often illegal, which is considered as one of the main reasons why the transition to apply more sustainable charcoal production practices has not been yet successful in Mozambique (Document 5. Luz, et al. 2015). The traditional charcoal production methods area also preferred by the local producers as they are less labour intensive than the improved production technologies (Document 2. Anastassov, 2014). In fact, in the areas where forest resources are still abundant, like in North of Mozambique, the yield may not be an important parameter for the selection of the kiln type but more important is that the technology is known to be easy and not to require much labour (Document 8. Mozambique Biomass Energy Strategy, 2012).	Based on the documents reviewed, the verification team agreed that charcoal producers in Mozambique use traditional inefficient earth kilns. The verification team has also observed that the charcoal producers sourcing charcoal to the urban area of Pemba are using traditional earth kiln production technology. The verification team has observed that the stacking procedure used for charcoal kilns used in Maputo and Pemba areas is similar. In both the places, there is no chimney or vents to regulate the air flow. Since the charcoal production in the traditional kilns is carried out by the informal sector hence beyond the control of the CME or local government authority. Maputo or Pemba is characterized as an area of dry tropical woodland, consisting mainly of Mopane woodlands interspersed with Combretum and Boscia dominated woodlands, with a C_4 grass layer. Most of the charcoal produced locally comes from Mopane woodlands, which are dominated by the tree species Colophospermum mopane, a dense hardwood species, which produces high-quality, slow-burning charcoal. The verification team understood from the onsite visit that charcoaling method consists of the following steps: (i) locating suitable trees; (ii) choosing the right place to build the kiln ; (ii) cutting the trees and transporting them to the kiln site; (iv) gathering material necessary for kiln construction (grass, clay/sand, and stones when available); (v) constructing the kiln; (vi) operating the kiln; (vii) unloading the kiln; (viii) putting the charcoal into bags. The process of charcoal production is labour intensive, mainly carried out by men and bears similarities in Mozambique in general. Hence the verification team has concluded that the charcoaling procedure, conditions, vegetation are similar in Maputo and Pemba, and the document used for Maputo can be used for Pemba as well. The same was confirmed by the local authority. Across these two cities, with similar climatic conditions, vegetation types and infrastructure apart from the similar traditional charcoaling technology,

	the verification team has convinced that conversion ratio of 7.14 applicable for Maputo is also valid for Pemba as well.
A recent literature review published by Martins (Document 6. 2016) confirms that kiln technologies used in Mozambique have efficiency between 13.6 - 13.8 % (corresponding to conversion factor of 7.35 - 7.25). The similar conclusion was made earlier by Atanassov (Document 2. 2014) who concluded, based on the literature and field research, that "Charcoal in Mozambique is produced by using traditional earth kilns and their efficiency is 10-20% with an average of 14%: a conversion ratio of 7 kg of woos for the production of 1 kg of charcoal. The field study of published in 2014 confirmed that the efficiency of the traditional kilns used in Mozambique is 8-13%. As a further example, CME refers the results of a field study published 2005 (Document 4) regarding measuring charcoal production efficiency in Sofala Province in central Mozambique (results of the study are based on measurements on 23 kilns) found that the average charcoal production efficiency was 13.7% (i.e. corresponding a conversion factor of 7.30 and in other words).	The verification team has reviewed the literature made by Martins, Atanassov and Falcao. This further corroborated the fact that 7.14 is valid and more conservative estimation of the efficiency of charcoal production in Mozambique.
ii) The study "Mozambique Biomass Energy Strategy" (Document 8. 2012) used by DOE/CME to support the use of conversion factor 7.14, in section 4.7.1.4 mentions that out of one ton of wood only 150 kg of charcoal is recuperated, representing a conversion factor of 6.67 kg wood per kg charcoal, and is more recent than the study used by CPA 9981-0003 The study "Mozambique Biomass Energy Strategy" published in 2012 (Document 8.) in its section 4.7.1.4 and, more precisely, in its reference nro 45 is citing the final report of the project called "Projecto Licuati III" published 2002 (Document 7). As a first consideration CME wants to clarify that the results of the project "Projecto Licuati III" are, in fact, published on 2002 and thus not more recent than the results based on which CME has selected to use the conversion factor 7.14. Secondly, it needs to be noted that the project the "Projecto Licuati" was a pilot project implemented during the years 1996-2002 and targeting a specific charcoal production area in Maputo Province. One of targets of the project was the introduction of more efficient charcoal technologies within the project area. The Final Report of the project concludes that at the end of the project two types of production technologies were found to be in used in the project area: the traditional kiln (forno tipo barco de arrumação longitudinal) with measured efficiency of 14% (corresponding to a conversion factor of 7.14) and the improved kiln model called "forno tipo barco de arrumação transversal" with the measured efficiency of 16% (corresponding to conversion factor	The verification team has accepted that the document which gives the value of 6.67 is actually based on study conducted in 2002 and applicable only for the area in which the pilot project had been implemented with the introduction of efficient production methods and thus not applicable to describe the general efficiency of the charcoal production in the whole country. This value was later referred in (document 8) in 2012. Hence, the value 7.14 provided by CME based on study published in 2004 is more recent. Hence accepted. In view of the above findings, the verification team would like to state that there is no need for revision in monitoring report or verification report.

of 6.25). The report concluded thus that from the three efficient kiln types introduced by the project ("forno tipo barco de arrumação transversal", " forno redondo (Casamansa)" and "forno de forma piramidal ou escavado") only the "forno tipo barco de arrumação transversal" had been adapted by the local charcoal producers and fund to be used in parallel to the traditional technology. The success of this specific efficient kiln model was explained to be caused by the fact that the technology was the most similar to the traditional kilns used in Mozambique and, moreover, not requiring extra labour as the other two introduced efficient kiln models. As a conclusion, the efficiency of the two kiln models (traditional kiln and one improved kiln) found to be used in the project area of Licuati project is averagely 15%. This average efficiency can be, however, considered to be applicable only to the project area of Licuati pilot project, not to the whole country of Mozambique. In fact, as indicated by the recent reports, in generally, the attempts of introduction of more efficient charcoal production methodologies in Mozambique – these attempts have been made mainly in the southern part of the country where both the demand for charcoal and pressure on forest resources are higher than in other parts of the country - have not been successful (Document 6. Martins, 2016; Document 2. Anastassov, 2014). The same conclusion is stated also the "Mozambique Biomass Energy Strategy published in 2012 as well as the earlier studies like Falcão 2005 (Document 4). In conclusion of the above clarification, CME considers it to be justifiable to use the conversion factor 7.14 kg wood per kg charcoal for the CPA 9981-0003.	

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