The exams watchdog has warned Michael Gove that his plans to replace GCSEs with an English baccalaureate qualification are effectively unworkable, and is urging him to make changes.

The comments by Glenys Stacey, chief regulator of Ofqual, come in a letter sent to the education secretary last month and released by Ofqual after MPs quizzed Gove on Wednesday morning. The letter, copied to Sir Michael Wilshaw, the chief inspector at Ofsted, is a significant blow to Gove's plans and follows CBI criticism of the changes.

Gove refused to tell the Commons education select committee what concerns Ofqual had raised about his planned replacement exams for pupils at 16, also known as the Ebacc or EBC. Gove said Stacey had written to him but that they would need to ask Ofqual for details.

After Gove's appearance Stephen Twigg, wrote to education officials requesting the letter under freedom of information laws. Ofqual soon released it.

In the letter, dated 19 November, Stacey tells Gove that Ofqual broadly welcomes "what we understand to be your policy aims" in replacing GCSEs with a system that gives students the best possible outcomes. However, she lists three concerns, notably that the ambitions for Ebaccs "may exceed what is realistically achievable through a single assessment".

The exam-dominated system, in which students will take five core subjects – English, maths, a science, a language, and either history or geography, topped up initially by separate GCSEs – is intended to provide a rounded education and be the basis for school league tables data, be immune to "distortion" from teachers under league table pressures, enable consistent standards and be "capable of being passed by a large majority of students", Stacey notes.

Her letter continues: "Our advice is that there are no precedents that show that a single assessment could successfully fulfil all these purposes."

Stacey is concerned about how Ebaccs will provide data for school league tables. In the short term this could cause difficulties, Stacey says, noting that the chaos over revised English GCSEs this summer "shows starkly how school acceptance of outcomes can be damaged when unexpected variations occur".

In the longer term, she warns, such qualifications are "not ideally suited to forming the sole basis for accountability measurement" and could lead to "more limited" teaching as schools cram students to pass.

Lastly, Stacey warns that Gove's plan to allow only a single exam board per subject could cause severe difficulties. Those boards that miss out on a subject will most likely lose many of their experts in that area, potentially jeopardising their ability to, for example, set A-levels in that area.

The letter, copied to Wilshaw, follows vehement criticism from arts groups about the lack of any arts subjects in the core EBacc curriculum, a complaint echoed by the actor Jude Law as he presented the Turner prize this week, and by the artist who won it, Elizabeth Price.
Last month the CBI questioned the need for a significant set of exams at 16, given the imminent rise of the school leaving age to 18.

After the release of Stacey's letter, Twigg said the EBacc was "narrow and out of date", and opposed by the CBI. "Now his exams chief says that the quality and reliability of exams will be damaged by his plans, and that it will make the classroom experience 'more limited'. With businesses and education experts opposed to his changes, he needs to think again."

Nonetheless, it seems Gove remains undaunted. He told the committee he would be willing to overrule Ofqual and press ahead if he believed the changes were right: "If they still had concerns and I still believe it is right to go ahead then I would do it, and on my head be it."

A DfE spokesperson said: "We have been clear that the exams system is in desperate need of a thorough overhaul. That is why we want to introduce rigorous, robust and relevant exams for 16-year-olds, which will raise standards and give all young people the chance to succeed. "We have launched a three-month consultation on our plans, and want to hear a wide range of views from all interested parties, including from the independent regulator.

"The consultation closes on December 10 and we will respond in the New Year."