**Agenda:** To discuss the points below.

**Present:** Gareth, Akhila, Elena, Spyros

**Questions and points to clear up at the first meeting on PID:**

* What are the properties of the material and what is the most physically similar product?
  + Is there a safety data sheet?
* IP considerations:
  + Do they have IP concerning the low temperature firing conversion of MLS into ceramics?
  + Does SAAPI have any patent for making the MLS feedstock used by cambond?
  + Status of patents around the world - EU/US
* What product should we concentrate on?
* What should be the market niche?
* What’s the target audience?
* How flexible is their technology with regard to feedstock?
* Can we have more than three supervisions/two inventor meetings?
* Feedback on PID - anything we might have missed
* AOB

---

SP - Gareth wants to look at areas of evaluations of products of competitors, so what kind of areas should we define?

GR - he’s sent examples of standard fire retardant products, these are simplest examples, which one would put inside to make it fireproof, that’d be the simplest entry point. So a flat panel. Other products - concrete or with added chemicals. These sell at a premium, so that would be very attractive in terms of revenue. General boards are charged at premium anyway and some buildings demand using fireproof. GR isn’t aware of the range of fire resistant panels. Go from boards impregnated with boron to hybrids mixed with concrete/etc. Not certain how many categories there are (3 or 4?). Also the biggest difference - how long they resist the fire. In general, one would want to use the cheapest, so might need to specify more/less fire resistance. So some of the differences are to do with how fire resistant they are.

SP - applications that take into account performance, not aesthetics?

GR - aesthetics would be too complicated. Perfect solution for them: their material being as fire resistant as heaviest most fire resistant material Stre

EG - any safety/physical properties tests?

GR - they’re getting that information atm. Likely to be physical strength tests. Not full fire retardant tests, but some sort of an idea. Suggest - look at what’s on the market and do a summary table of what sort of material it’s made of, what grade of fire resistance and any other properties and price. Main things - what do they say about it that’s good. Will be difficult to find any problems with the material apart from common sense (weight, cost). They want a list of attributes they need to match if they want to compete in this area

A - what’s the target customer? B2B/B2C?

GR - partner with someone making boards. They have a new material, commercial deal to manufacture and sell their product as well. They don’t want to set up the plant. THey want to either license or end up with a joint company. Model mostly is selling B2B. Bc consumers are anyway buying from distributors.

SP - IP considerations. Cambond has a patent for lignosulfonate process, which is a low temp firing process and sappi provides feedstock out of which biocomposites are made. Clarification on is it two patents?

GR - sapi: - lignosulfonates or sodium lignosulfonates have been around for a long time, and sappi has know-how and making it cheaply. The sulfonate is soluble in water, so making boards is tricky because of sticky surfaces and water absorbent, so they’d use that to disperse other stuff. So he’d look at IP around formulations around flame/fire retardant boards. That’s where they want to know where’s the competition. ANy simple ways of making fireproof boards? So shouldn’t spend much time on lignosulfonates, bc it wouldn’t be main thing. (a side note on coatings and aesthetics).

GR - does anyone have a clever idea (with biomass) that would be a fireretardant board.

AJ - we can look at patent databases

GR - they looked at simple products, key being low-temperature manufacture, which they thought was most different.

SP - any flexibility with respect to feedstock?

GR - not hugely complicated and ash and paper mill is just abundant and people don’t have where to put it. To put it lighter they’d need to add biomass (coffee, peanut shells, etc) grounded into fine powder. Non-smooth only if crush, then would have better tensile strength (similar to glass fiber).

EG - do you need ash and paper sludge?

GR - ash for minerals, and paper sludge some too, but different mills have variation in composition, with the amount of inorganic minerals. So ash to add minerals if needed

SP - you have technology for biocomposites, is the process/manufacturing cost sensitive to composition of the feedstock? Or could a broad range of be accommodated?

GR - +- 5 % doesn’t make a difference, 15% more ash would need to adjust manufacturing process. But setting up on larger scale - just need to identify the parameters/composition, so depending on feedstock just need to adjust

SP - and that’d depend on the quality of the finished product?

GR - the quality would be the same, but need to adjust for material from different mills, for example. But do that before making the board. So when mixing/formulating before press.

SP - markets - Cambond is planning to EU/UK manufacturing sites, should we focus there?

GR - **can focus on the UK**, bc, different regulations/building styles differ/could differ by a lot and uk have national standards, so by looking beyond UK would be a lot of work. Also sent a draft on standards we

EG- materials question - where does the fire resistance come from? Since paper sludge,ash and resin are all organic

GR- the inorganic materials from paper sludge - 15% might be enough, otherwise add ash. Depends on species of tree, soil type - therefore geographical variation. That means that they need quality control on the feedstock to maintain the concentration. But technically it shouldn’t be that difficult.

SP - G, you mention that you’d like to know the issues that might arise from using waste streams. Can you clarify/explain? Public awareness, knowing that the product came from waste streams?

GR - was alarmed when heard about legal case from North america and they had legacy burning coal and now they have a log of ash deposit and it was polluting waters, so gvt paid the company to get rid of it, but company didn’t protect the workers who were inhaling ash and developing respiratory diseases. So when they say a product has ‘env advantages’, are there any issues with using these wastes like that? So any potential issues? They want to look at it and deal with it. Also, what do people feel any products on the market have problems with? Can they say “the board won’t do this/it’s free from this/doesn’t have this.

SP - so paper mill sludge and ash?

GR - yeah, only paper mill sludge sometimes would put it as fertilizer and people were worried about heavy metals. But now if you’re buying it there should be a chemical composition analysis.

SP - so any issues from people/business being aware of any toxic anything?

GR - it’s more people have been concerned about heavy metal content in fly ash. So if spraying it around, are you contaminating anything? But do makers have to handle it? But now also have biomass ash, would it be simpler/better for them to take biomass ash?

SP - we can find information about this question in the industries that produce this waste?

GR - sometimes yes, but sometimes in the campaigning groups that have more/available info. Also background academic literature, but that’s difficult to work out the conclusions. So have to range fairly widely and have numbers that at least two groups came up with.

AJ - looked at PID?

GR - ok brief, general brief - things like the IP, limit that to who’s got/claiming any IP on flame retardant product rather than looking at individual chemicals. Stick to simple construction products. Let’s deal with the UK. If something could be configured for the UK, then it’d be a case-by case for the other markets. But that’d be tricky.

AJ - anything else?

GR - forget about doors, cases, etc. Liked homes in fire-prone areas. But that’s largely in other countries, so probs best for future work.

SP - green housing. E.g. Glasgow has plants for building low-carbon-footprint housing. Assessing carbon footprint of this product?

GR - key element in selling it. Bc sector is pressured to show sustainability and they don’t have many options to choose from. So info on concrete life cycle assessment (LCA) would be useful. Having env-friendly materials would have a big impact on sust/etc, but they wouldn’t need to change much on how they’re doing it.

SP - carbon tax, etc

GR - that’d be main driver, bc on current scale - we should also consider Grenfell but not much has been done despite that

--- lost track ---

GR - should have improved validation of fire-proof material, but also price is very important.

GR - could have as many meetings.

SP - Peter said we’d have supervision next week, etc. Also asking of both for a meeting on week starting on 14th Dec.   
GR- ok, sensible - get enthusiastic, and then too late people realise that this has gone off-track. Meetings can long or short. Happy to respond emails with questions.

SP - will send an email on possibly having a meeting after supervision, but when would be ok on normal week?

GR - with notice anytime.