Cost –capex & opex

- Highly application/market/country dependent – case by case consideration
- Level/type of contaminant, regulation issues
- Local/topical/political issues
- Lifetime of key/expensive components
- Ebeam is potentially an economically viable solution

Energy efficiency/carbon footprint

- As above – market/application dependent
- Electricity in vs beam power out varies depending on type of accelerator
- Existing solution for sludge treatment is not very energy efficient

Scalability

- Managing flow is key
- Easy to reduce capacity, but outlay for several accelerators will be significant
- Depends on configuration

Mobility/portability

- Ideally container size – this is possible
- Would help with marketing/sales efforts
- MOD/disaster zones/third world are potential markets – flexible usage

Specific contaminants eg new pesticides, hormones, pharma, cryptosporidium

- Key R&D area into exotics that have a disproportionate environmental or health impacts
- Fast degradation
- Must be careful not to create a new & worse problem
- Big R&D opportunity (collaboration with CEH??)
- Could open up new possibilities for different metal working fluids – introduce something that was not previously treatable

Resource recovery eg phosphorous, nitrogen, platinum

- Another key R&D area eg mining industry would be very interested
- Ability to deal with mixture of organic & metal contaminants has not been studied in depth

- Changing redox of metals in solution to precipitate metals out

Treatment for aesthetic properties eg colour

- generally is possible to remove colour from water with ebeam

Reliability

- Main components are cathodes (3000-4000hrs operation) and windows (2000 hrs operation depending on beam power) – need regular maintenance
- Expect this to improve over time. If the accelerator can solve specific niche high-impact problems, this will be less of a consideration
- Design in protection systems to prevent component failure affecting other parts of the system leading to long shutdown

Methane conversion and capture

- Strength of ebeam is that it can break down large molecules in to something useful – potentially can increase methane recovery

Compactness

- Technology is moving in this direction already
- Driver from eg hospitals

Ease of integration

- Must squeeze in with legacy systems
- Can fall back to old systems if solution fails – existing plant is not going to be demolished and replaced

Skills needs

- Need to be simple to operate day-to-day
- Need to consider what skills are needed at a higher level – technology experts
- Autonomous systems will help with the monitoring and operation

Other beam types could be studied eg protons, carbon, ions etc