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# Tomorrow's Tip Today: Reimagining the Landfill of the Future

# Welcome

***Change is the only constant in life.***

→ **Heraclitus**

# What exactly is changing?

- Ongoing tightening of environmental rules and regulations
- Increased community awareness – social license to operate
- Emerging technologies

- Move toward residual waste streams – result of initiatives such as FOGO, EfW and a drive for circularity
- Embedding sustainability
- Climate change

# What does the industry think?

Not in my backyard (NIMBY) – will new landfill projects be approved in the future?

There needs to be leadership at state government level to plan waste infrastructure requirements

Landfills can and should be sustainable

Landfills are unavoidable. Despite 'sexier' technologies emerging (e.g. EfW), there will always be a need for landfills to manage residual waste

PFAS in leachate and gas – old systems do not treat, need for different systems to treat, will water authorities continue to accept PFAS-containing waters?

Robo-landfills!!

There is so much we can learn from overseas, we don't need to make the same mistakes again

The price of landfilling will only go up, do we need to rethink how they are funded?

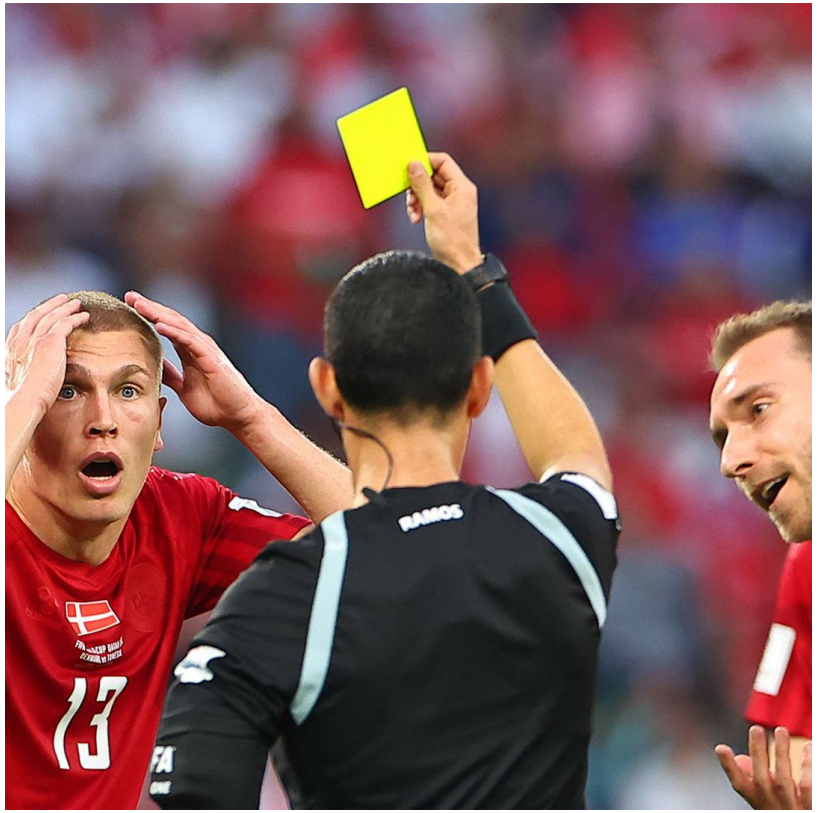
The last few years have seen astronomical costs associated with leachate disposal, the industry needs to unite and work out the best way forward if this trend continues



# Ground rules (i.e. we only have 20 minutes!)

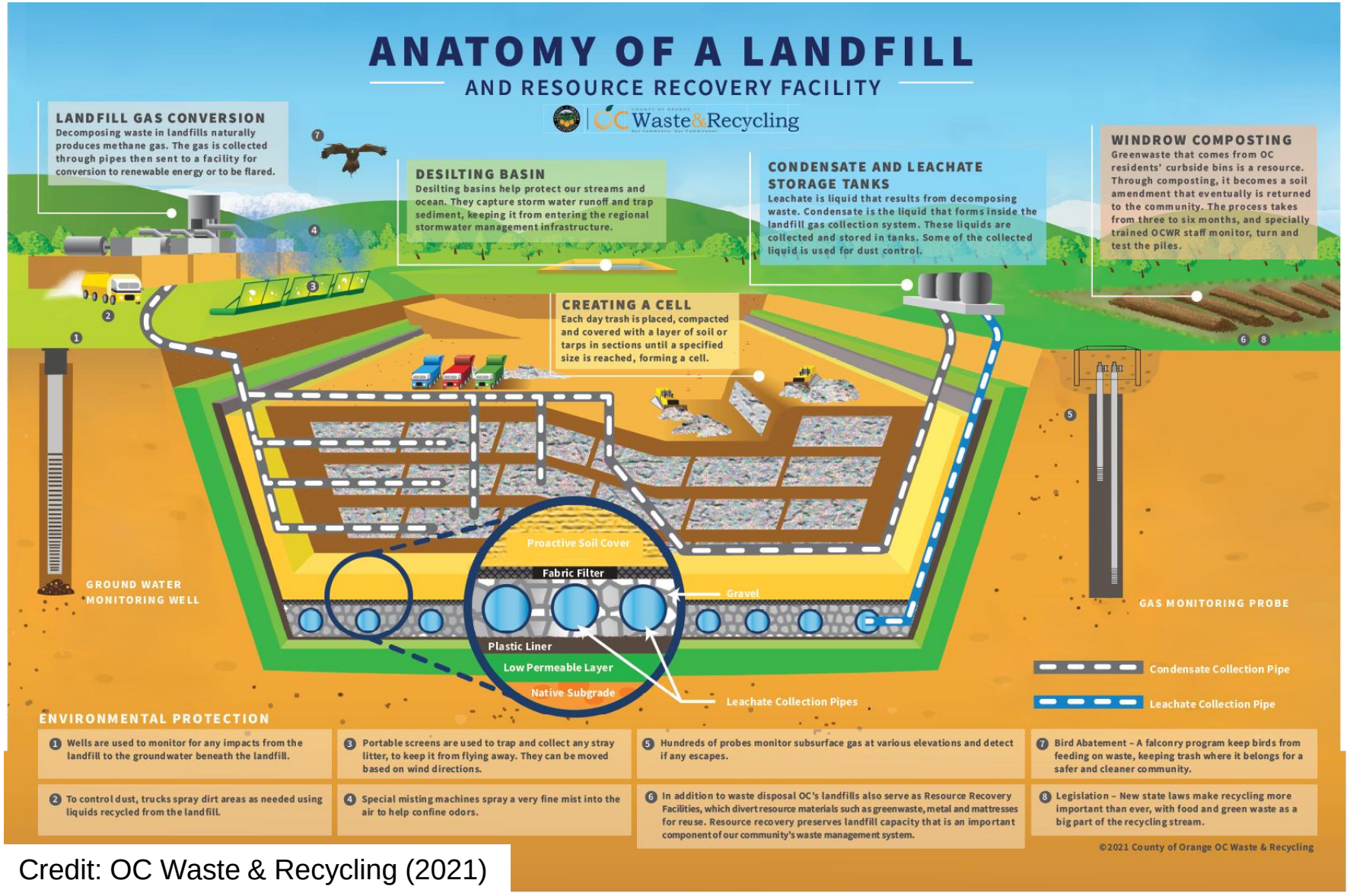
- Future = near future (~30-year horizon)
- Focus on the landfill itself – noting trends toward integrated waste facilities / hubs
- Focus on operational sites – noting the significant quantum of landfill sites finishing up to be closed/rehabilitated in this same timeframe (and maybe even mined?)
- Won’t be able to cover everything – focus on key issues





# Let’s start with a modern landfill




Credit: OC Waste & Recycling (2021)



# Containment, more is more?

- **Design:** Site specific testing required for material selection based on waste and leachate characterisation

- **Components:** Composite liners no longer enough, need to consider more complex, multi-layered solutions (such as double liners, maybe even triple?!)

- **Robustness:** Inclusion of leak detection and other contingency measures

- **Monitoring:** Advancements in technologies for early detection of liner leakages and other issues

- *Many of these changes align with how we approach industrial/hazardous waste facilities, what lessons learnt can be applied?*

# Landfill gas, good news and not-so-good news

- **Incremental improvements:** Optimised extraction, battery storage, reduced emissions

- **Refinement:** Opportunity to convert landfill gas to renewable natural gas:
  - Reduced emissions
  - Higher revenue potential (e.g. in North America via market incentives such as low carbon fuel standards, tax credits from renewable identification numbers, etc.)

- **Generating potential:** Will landfill gas capture still be viable for residual waste landfills?

- **Emerging contaminants:** PFAS in landfill gas??

- *We want to continue to maximise gas treatment and reuse to minimise greenhouse gas emissions, but viability and volatility may result in an uncertain future*

*Disco Road RNG Plant*



# Water water everywhere, nor any drop to drink

- **Climate change:** Projections suggest higher and more sustained peak events:
  - More leachate
  - Increased surface water infrastructure sizing
  - Siting constraints due to sea level rising hazards and flood plain concerns

- **PFAS:** How/where will PFAS be treated? Will PFAS removal from leachate be required to allow disposal to sewer, and if so, do the disposal mechanisms change?

- **Other emerging contaminants:** What about other emerging contaminants? Microplastics??

- *Resolution of the emerging challenges for leachate management will require active participation from multiple parties – including environmental regulators, landfill owners/operators and water authorities – to achieve a pragmatic solution*

# When will robots take over our landfills?

- **Well established:** UAV/drone survey and aerial photogrammetry/photography, automated instrumentation and control for leachate management, weighbridge technologies, and many more

- **Building capability:** Drone landfill gas monitoring

- **Future:** Remote operated plant & equipment?

- *Advancements such as automation, AI and other technologies are critical to improving safety, performance and compliance at landfills*

*Credit: Pixar Animation Studios (2008)*



# Wait a minute, but no-one wants new landfills!

- **Siting:** Likely to be outside of metropolitan areas, trending toward a reduced number of dedicated purpose-built facilities. Need to be connected to cities by rail, can this be linked into larger infrastructure strategic imperatives?

- **Planning:** Needs to be considered at a higher level – state/national planning – future proofed and transparent to the community

- **Funding:** Incremental changes will result in additional costs to construct and operate, as well as increases to transport costs as we move to fewer and more regional facilities.

- **Social license:** Building trust and credibility will be more and more important as the community will continue to have high expectations for landfills, and this will need to come from all levels

- *A comprehensive, well-researched and evidence-based plan is paramount. Without it, we will miss key opportunities and risk significant impacts across future generations*

# Final thoughts

- Change is coming – but we don’t have to “reinvent the wheel”, rather we need to “stay ahead of the game”

- State and national leadership is important – but the whole industry has a part to play to maintain community acceptance / social license to operate

- Consistent and stringent environmental regulations are important, but they shouldn’t hinder positive innovation and pragmatic practices – balance is key

- Failing to plan is planning to fail – so what are we waiting for?



# Thank You

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