

# SCALING UP MEC FOR WASTEWATER TREATMENT



Sarah Cotterill, Cohort IV

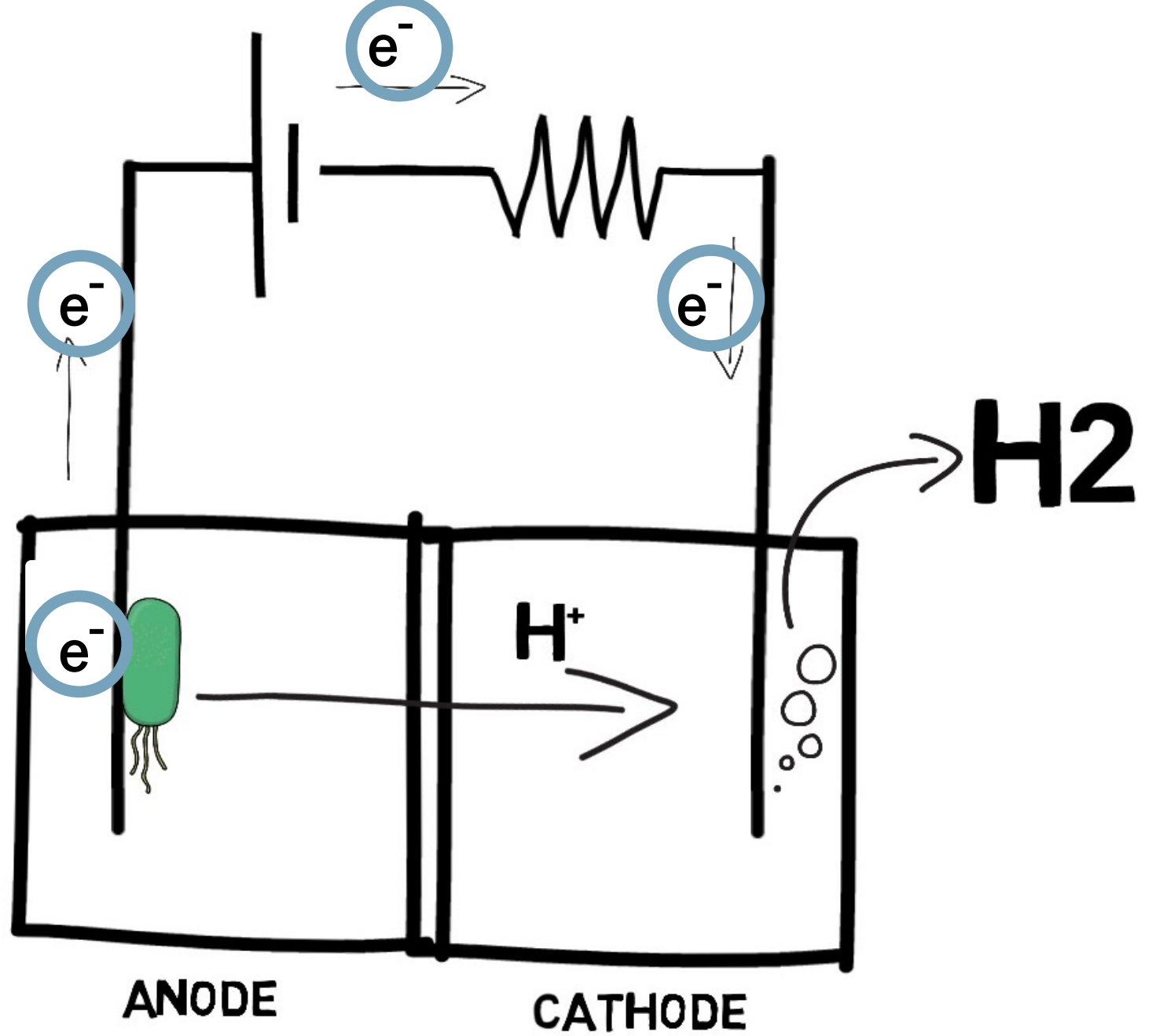


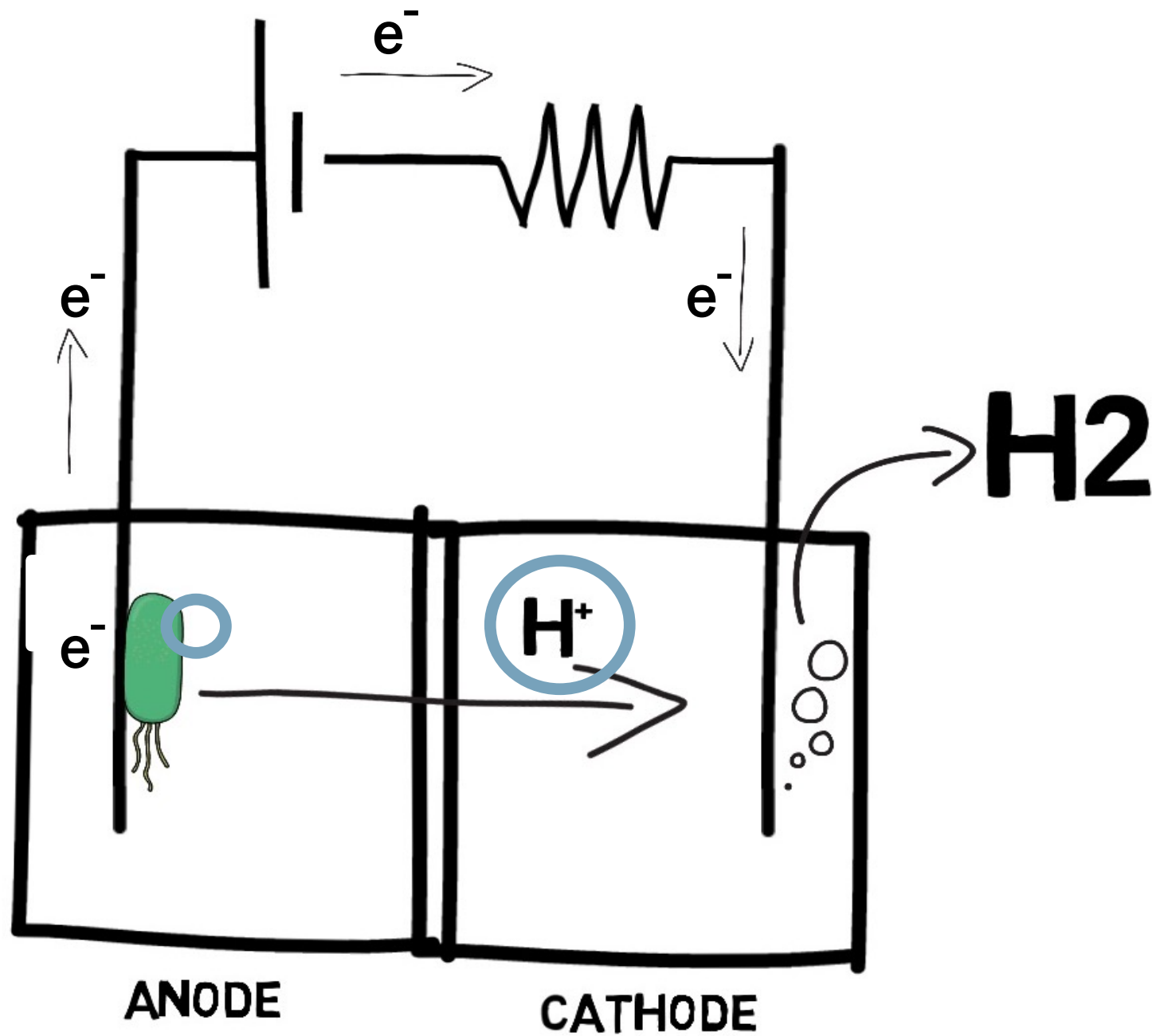
It's Time to Reveal Today's

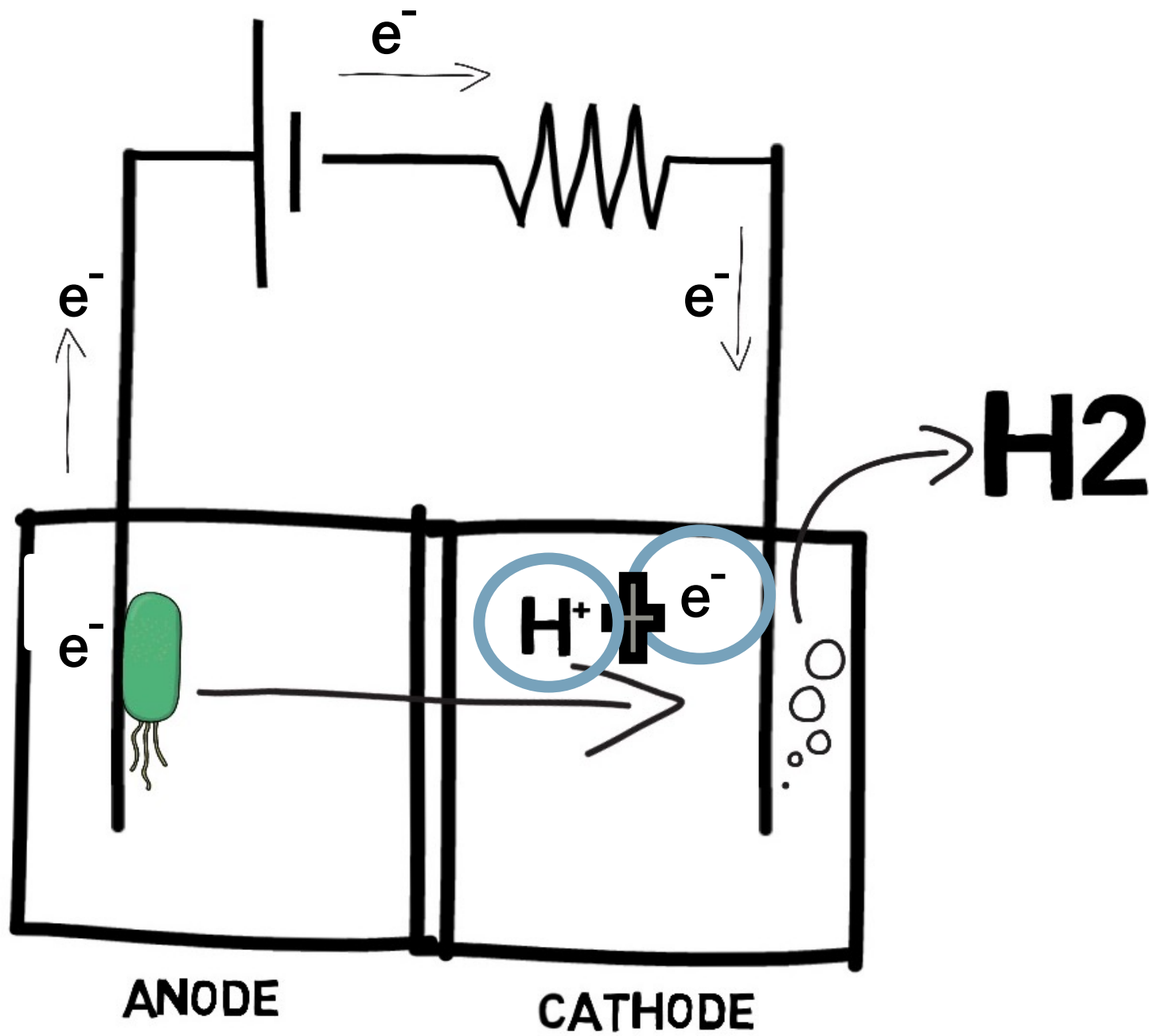
M I S S N O I S E

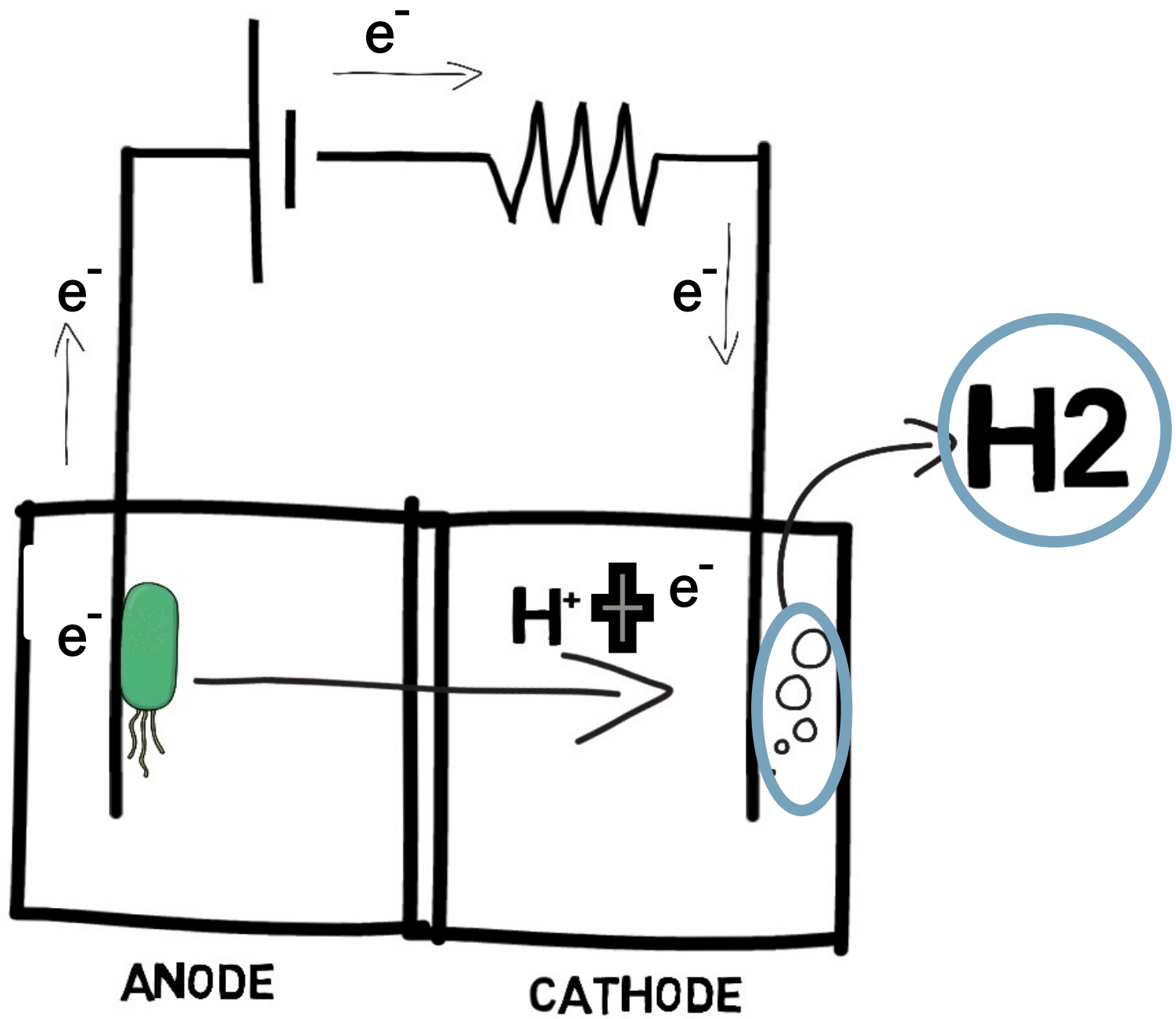
E M I S S I O N S

Solve









Howdon STW, 2011



100 L tank

130 L tank



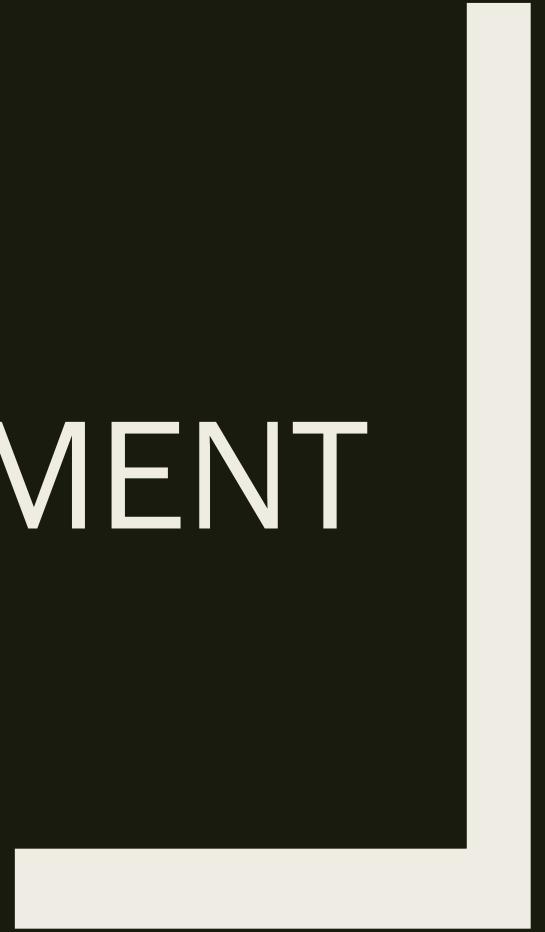
Fishburn STW, 2014

Chester le Street, 2015

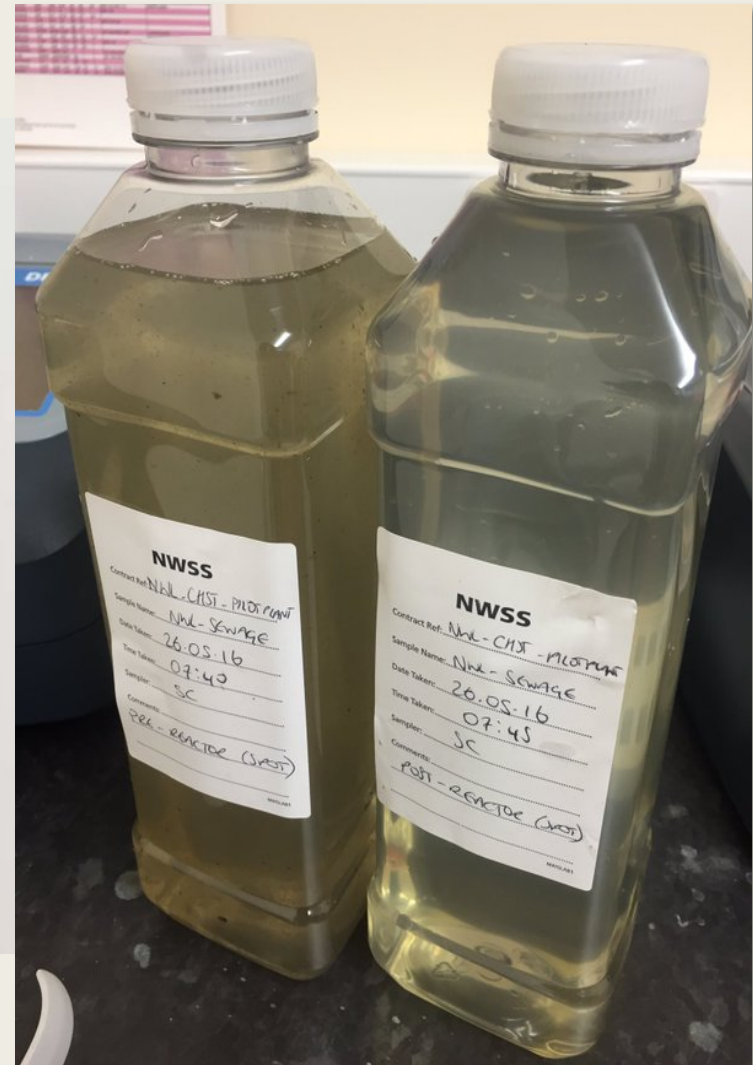


200 L tank

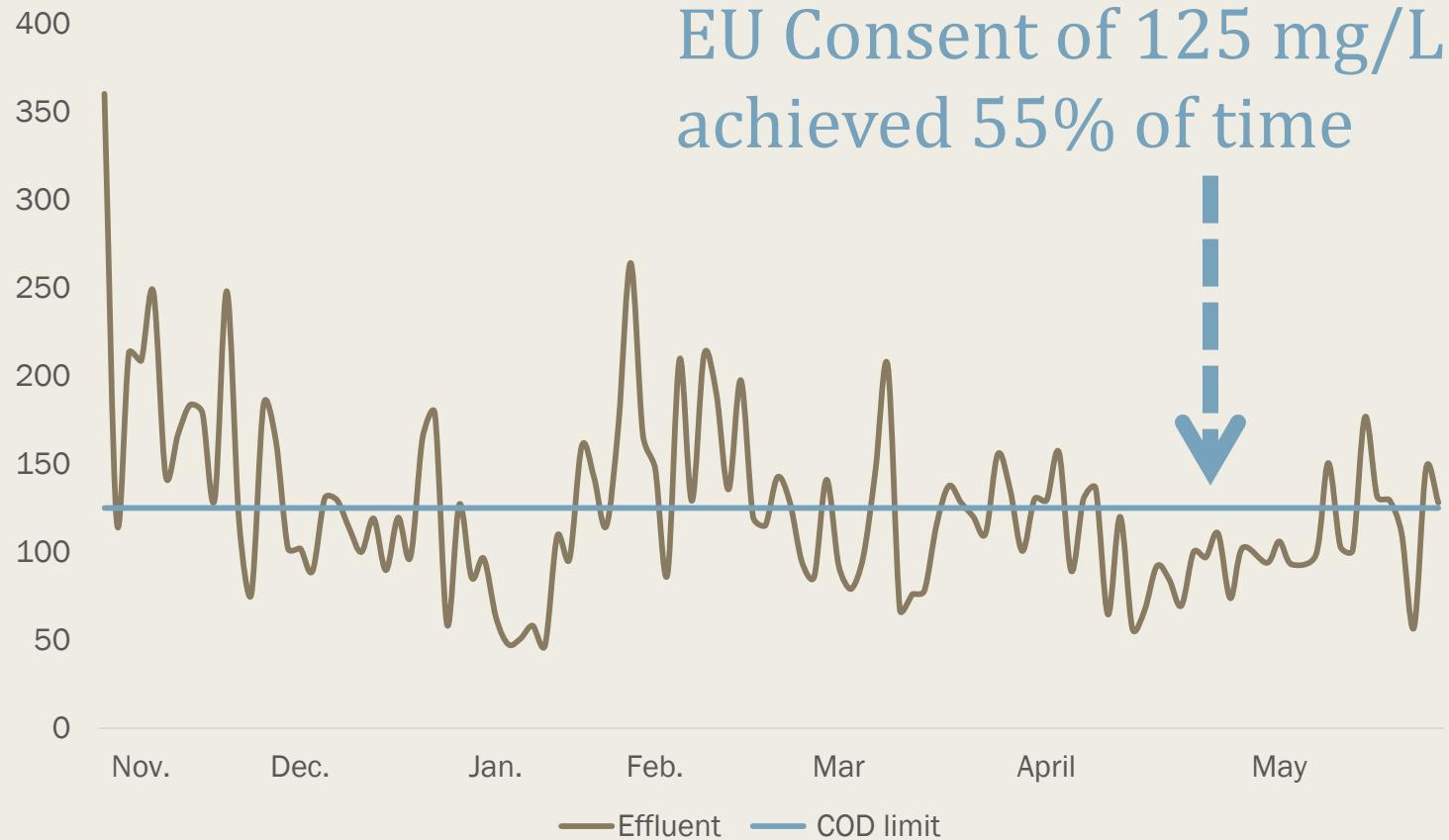
TREATMENT







**Effluent COD = 121 mg/L**  
**65%  $\Delta$ COD, 63%  $\Delta$ BOD, 74%  $\Delta$ TSS**



Treatment is inconsistent.

SIZE



$A4$  ( $0.06\text{m}^2$ )

$A0$



( $1\text{m}^2$ )



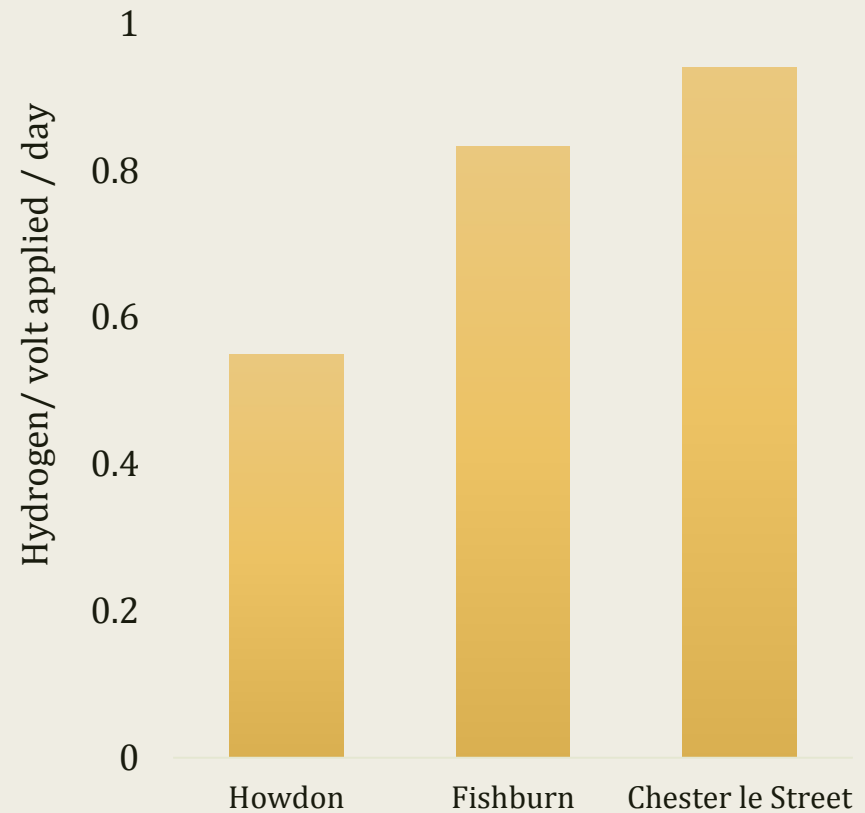
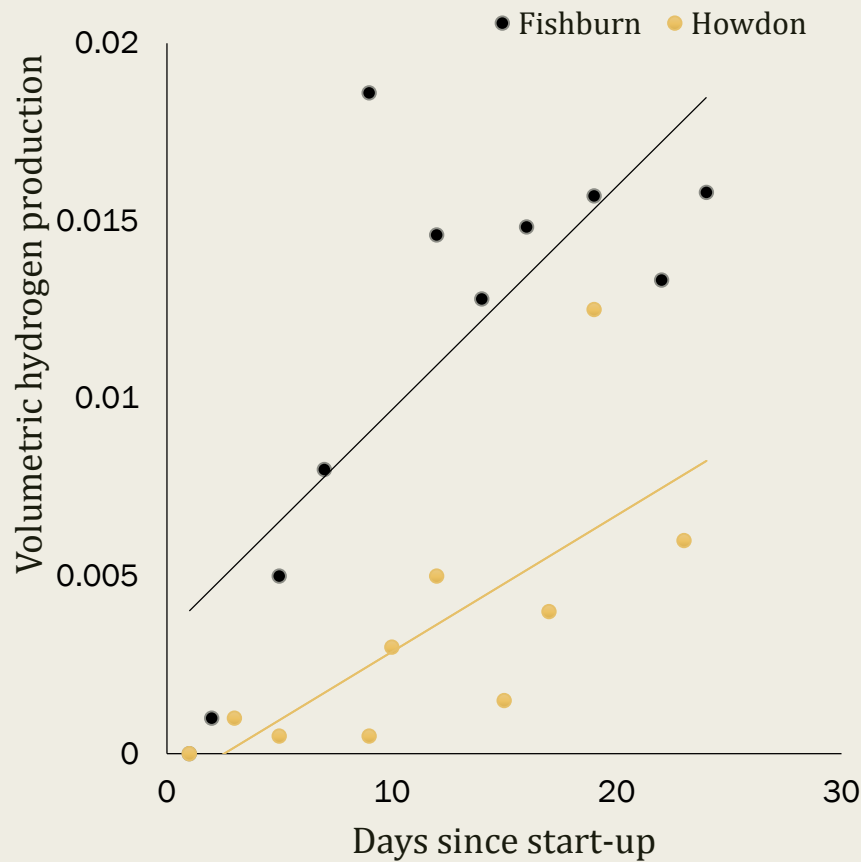
HRT 24hrs  $\rightarrow$  4hrs

**BUT NEEDS TO BE  
30x LARGER TO  
RETROFIT**





HYDROGEN



↓ Energy input reduced by 20% (from 1.1V to 0.9V)

↓ Energetic cost of treatment (kJ/gCOD) reduced

...AND BEYOND

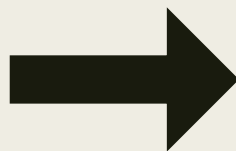




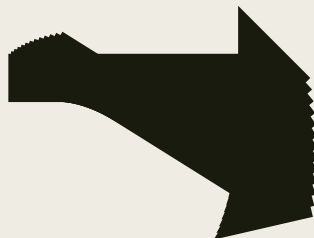
Bleach  
( $\text{H}_2\text{O}_2$ )

Caustic  
( $\text{NaOH}$ )

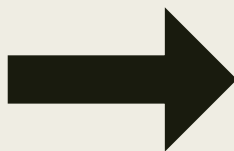
Higher value  
organics  
(1,3-propanediol,  
succinate)



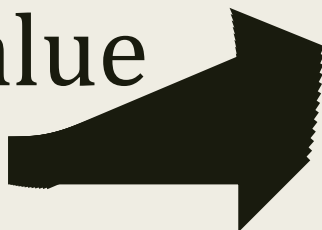
Bleach  
( $\text{H}_2\text{O}_2$ )



Caustic  
( $\text{NaOH}$ )



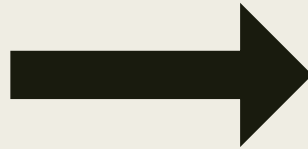
Higher value  
organics



(1,3-propanediol,  
succinate)

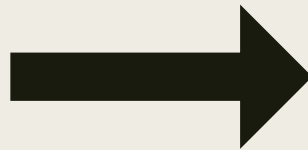
Hydrogen = £

Bleach  
(H<sub>2</sub>O<sub>2</sub>)



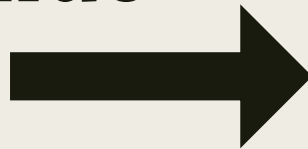
££££

Caustic  
(NaOH)



££££££

Higher value  
organics

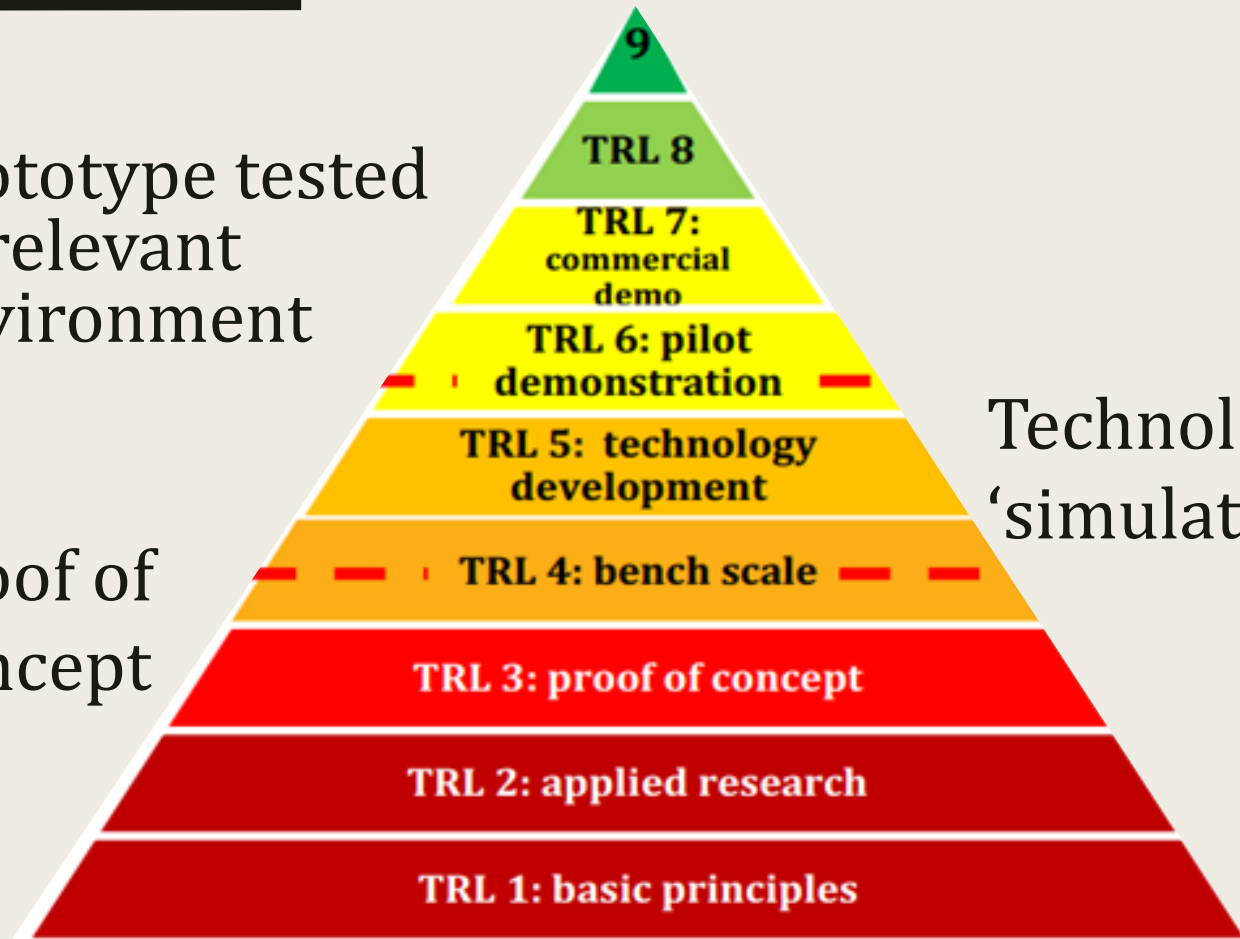


££££££££

(1,3-propandiol,  
succinate)

Prototype tested  
in relevant  
environment

Proof of  
concept



Technology  
'simulated'

COD removal is  
good

Module size has  
increased 16 x

H<sub>2</sub> production  
has increased  
every time

...although a little  
inconsistent

...but needs to be  
30x bigger again  
to retrofit

...but H<sub>2</sub> is just the  
beginning



Sarah Cotterill

@powerfrompoo

It's frosty: had to scrape ice off to read pH! Air temp -1°C, ww T 6°C...still 1.4L of H<sub>2</sub> in past 45 hours #streamidc



Sarah Cotterill

@powerfrompoo · Mar 10

This week, 1 cell alone produced >5L #hydrogen @ThomasPCurtis @NorthumbrianH2O @STREAMstreamer #wastewater #energy



Sarah Cotterill

@powerfrompoo · Apr 1

#wastewatertreatment using a #pilotscale #microbial #electrolysis #cell @STREAMstreamer @NorthumbrianH2O



@powerfrompoo

Prototypes, Pipedreams and Power from Poo

...snippets from a sewage engineer on STREAM

www.powerfrompoo.wordpress.com

## Exit Music (for a research engineer)

Posted on June 7, 2016

I've just returned from a lovely trip to Barcelona for a music festival (Primavera Sound). I was lucky enough to enjoy (from the VIP area next to the stage) Radiohead playing some of their best known classics such as *No Surprises*, *Karma Police* and *Creep*. Whilst they didn't play *Exit Music (for a film)* it seemed an appropriate title, after a fortnight of change and handovers.

## #DrinkTap: The Water Pitcher Challenge

Posted on May 6, 2016

Last week I entered the Institute of Water's 'Water Pitcher Challenge'...



## Swim, Cycle, Run, Cry...

Posted on May 2, 2016

About 10 weeks ago, I decided that I fancied doing another event for WaterAid. I like to push myself and so it needed to be harder than last year's 10km mud run – something more of a challenge. So at the end of February, I signed up for WaterAid's [Hanningfield triathlon](#).

WaterAid



United Kingdom