Day Zero: your turn

A city of four million, dry dams, 120 days to the rains: days to Day Zero, price vs ration, mixing tools, and the five questions of the whole course.

1 Problem

counting the days

- **Day Zero** = day taps go off (Cape Town 2018: dams at **13.5%** ⇒ 25 L a person a day, ≈ 200 collection points)
- `days = water ÷ daily use` · toy numbers: 60 bn (billion) L ÷ 1 bn = **60 days** · rains in **120 days** ⇒ allowed use `water ÷ days` = **500 million** a day ⇒ use must **halve**
- Practice: 90 bn, 1 bn a day, rains in 150 ⇒ **90 days** to Day Zero · allowed **600 million** · cut **40%** · rains in 100 days (60 bn) ⇒ allowed **600 million**

2 Tools

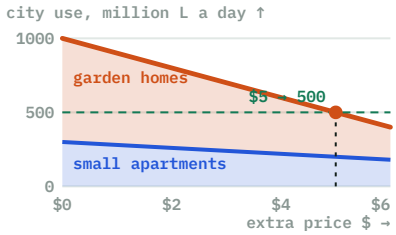
four levers

- **Price** (extra $ per 1,000 L above a basic 150 L) ⇒ **move along** the demand curve · **ration** (limit per home + fines) · **campaign** (tips, dam dashboard, neighbor letter) ⇒ **shift left** · **new supply** (seawater plant)
- **Policy lag** = time from choice to effect · plant ≈ **1 year** > 120 days ⇒ **too late** (Cape Town: first small plant May 2018)
- Sort: price to $3, doubled, cut to $1 ⇒ along · ads, dashboard, neighbor letter ⇒ shift

3 Price

who cuts more?

- Toy city: a million **garden homes** 700 L a day – 80 per $1 · a million **small apartments** 300 L – 20 per $1 · city `1,000 − 100p` (million L; `p` = extra price, $ per 1,000 L)
- Garden water = **elastic** (lawn, pool: easy to skip) · apartment water = **inelastic** (drink, cook, wash) · **$5** ⇒ garden 300 (cut **400**), apartment 200 (cut **100**), city **500**
- Practice: rains in 100 days ⇒ **$4** ⇒ garden 380 (cut 320) · apartment 220 (cut 80) · city 600



4 Ration · mix

equal cut, tools

- **Equal ration** = **half** for every home ⇒ garden 350 · apartment 150 (3 people ⇒ **50 L** each, Cape Town Feb 2018) · same city total 500 · asks the **same share** of everyone, even homes with little to cut
- **Mix**: campaign –100 ($2M) · lower pressure –100 ($10M) · price $3 –300 ($0) · seawater plant 0 before the rains ($100M) ⇒ all three = **500** for **$12M** · apartment keeps 180
- Target 600: campaign + price = **600** for **$2M** (cheapest) · pressure + price = 600 for $10M · apartment **210**, garden **390**

5 Evidence

Cape Town · budget

- Use ≈ **1.2 bn** L a day (Feb 2015) ⇒ ≈ **0.5 bn** (Mar 2018): more than **halved** · Day Zero never came · winter rains 2018 refilled the dams
- Bills of 500,000 homes: average ≈ 540 ⇒ 280 L a day (Jan 2015 ⇒ Jan 2018) · the **10%** of homes using most took **31%** ≈ 3× an equal share · richer homes cut most when shown their neighbors, poorer ones when the price changed
- Which lever did most: **debated** (all started within months, no lottery to split homes into groups)
- **Fixed cost** (pipes, dams, staff) ⇒ sell less, earn less · `income = lots of 1,000 L × price` · $2 × 1M = **$2M** → $1M · cost $1.5M ⇒ **–$0.5M** a day · Cape Town expected a gap of ≈ R2 bn (South African rand, ≈ $140M)

6 Trade-off

policy card

- `FOR A PRICE` each home **chooses** where to cut · easiest uses (garden) go first · a family with a baby can still buy what it needs
- `FOR A RATION` **equal** shares · nobody can pay to use more · a rich home cannot pay to keep its pool full
- **Positive** (data can test) “use fell by more than half” ≠ **normative** “rich homes should pay more” (values) · which matters more is **yours to decide**
- Five questions: **problem** dams run dry before the rains → **tool** price · campaign · pressure (plant too late) → **model** price cuts garden water most; equal ration = same share for all → **evidence** use more than halved, no Day Zero → **trade-off** choice vs equal shares · who pays for the pipes