



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.

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Problem

counting the days

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

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Tools

four levers

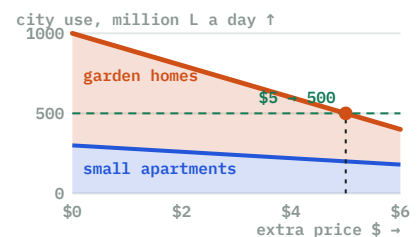
- **Price** (extra \$ per 1,000 L above a basic 150 L) $\Rightarrow$ **move along** the demand curve · **ration** (limit per home + fines) · **campaign** (tips, dam dashboard, neighbor letter) $\Rightarrow$ **shift left** · **new supply** (seawater plant)
- **Policy lag** = time from choice to effect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

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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** $\Rightarrow$ garden 300 (cut **400**), apartment 200 (cut **100**), city **500**
- Practice: rains in 100 days $\Rightarrow$ **\$4** $\Rightarrow$ garden 380 (cut 320) · apartment 220 (cut 80) · city 600



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Ration · mix

equal cut, tools

- **Equal ration** = **half** for every home $\Rightarrow$ garden 350 · apartment 150 (3 people $\Rightarrow$ **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) $\Rightarrow$ 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**

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Evidence

Cape Town · budget

- Use $\approx$ **1.2 bn** L a day (Feb 2015) $\Rightarrow$ $\approx$ **0.5 bn** (Mar 2018): more than **halved** · Day Zero never came · winter rains 2018 refilled the dams
- Bills of 500,000 homes: average $\approx$ 540 $\Rightarrow$ 280 L a day (Jan 2015 $\Rightarrow$ Jan 2018) · the **10%** heaviest homes used **31%** $\approx$ 3x 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)
- **Fixed cost** (pipes, dams, staff) $\Rightarrow$ sell less, earn less · $\text{income} = \text{lots of } 1,000 \text{ L} \times \text{price}$ · $\$2 \times 1\text{M} = \2M $\rightarrow$ \$1M · cost \$1.5M $\Rightarrow$ **–\$0.5M** a day · Cape Town expected a gap of $\approx$ R2 bn ($\approx$ \$140M)

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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** “use fell by more than half” $\neq$ **normative** “rich homes should pay more” (values) · which matters more is **yours to decide**
- Five questions: **problem** dams run dry before the rains $\rightarrow$ **tool** price · campaign · pressure (plant too late) $\rightarrow$ **model** price cuts garden water most; equal ration = same share for all $\rightarrow$ **evidence** use more than halved, no Day Zero $\rightarrow$ **trade-off** choice vs equal shares · who pays for the pipes