The Role of Efficiency in the Utility of the Future

Getting Los Angeles to 100% Renewable by 2025

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By Ted Flanigan, President
EcoMotion

About EcoMotion

The cost-effective greening of cities, corporations, and campuses is our mission

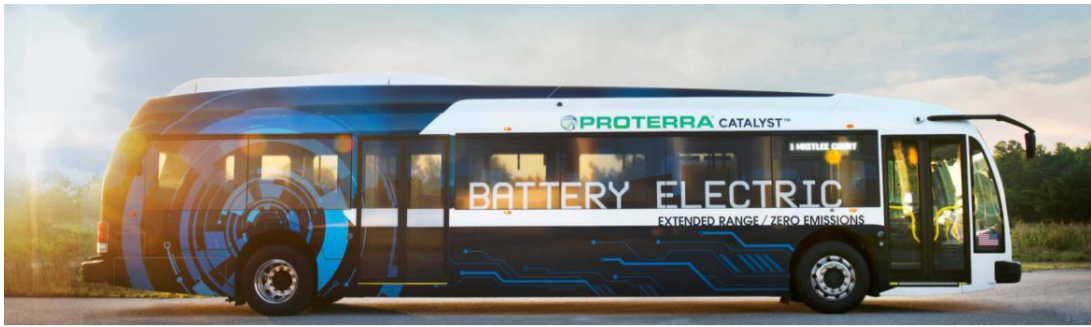
- Incorporated in 2001, based in Los Angeles
- School District Energy Managers for
  - CUHSD, CSD, FUESD, GGUSD, PUSD, SRUSD, SSD, and others; >130 campuses; eight charter schools
- 30+ years of track record in planning, designing, implementing and evaluating efficiency and renewable energy programs
- 10+ years of management of the award-winning Solar Santa Monica program; 5+ years LA Metro
- Building 12 microgrids in Northern California, PERCs

A Mayoral Campaign Story

- Approached by Mitchell Schwartz, candidate for mayor, who ran against Eric Garcetti, March 2017
- Given my LADWP experience, he asked me to write his energy platform.
- He's a good guy: I agreed to a back-of-the-envelope exercise only with help from a smart trio:
  - Dave Freeman, Angelina Galiteva, and Mary Nichols
- Oh by the way… Mitch came in second and lost in a landslide (8 vs 81%) <u>because</u> of his energy platform. (Just kidding!)

The Mitchell Schwartz Plan

- Fully supported transition to electric vehicles
  - Cars and buses
- Included means to offset the natural gas capacity at the Aliso Canyon underground gas storage field
- Would accelerate termination of Intermountain Power Plant coal contract
- Would create world's largest distributed storage system; doubles Castaic capacity with distributed storage, +1,500 MW/7,500 MWh

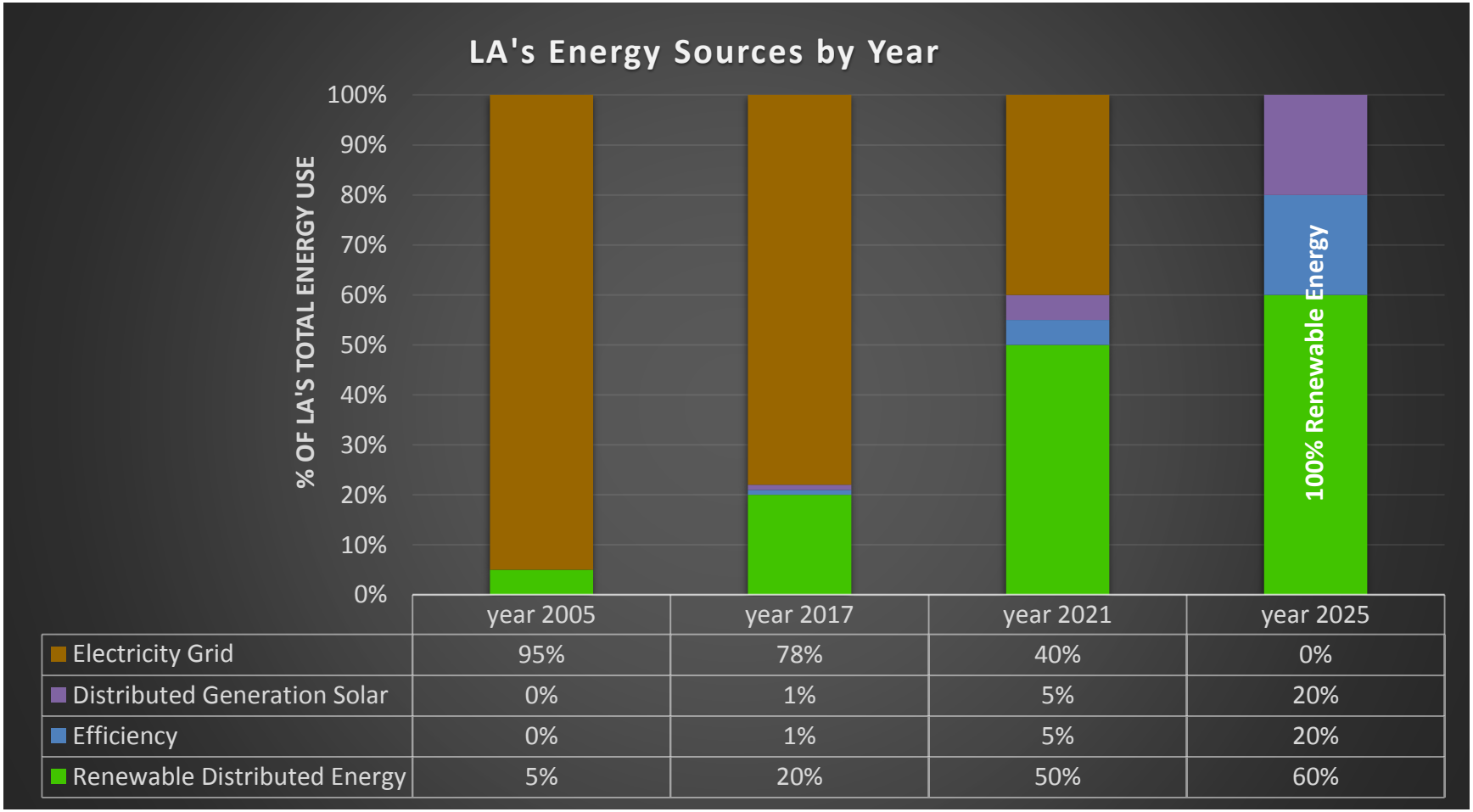


The Goal and Reality

- The Bold Campaign Platform
  - 100% renewable by 2025
    - Ten years before Mayoral pledge (2035)
    - While we electrify cars and buses, +~6,000 GWh
    - Current City-wide use ~24,000 GWh

- Will need to fulfill ~30,000 GWh of energy use
- Renewables will have to grow 3x to 18,000 GWh
- DG will have to grow from ~2,000 to 6,000 GWh
- Efficiency will have to grow by 20x to 6,000 GWh

The Rise of Efficiency in LA



	year 2005	year 2017	year 2021	year 2025
Electricity Grid	95%	78%	40%	0%
Distributed Generation Solar	0%	1%	5%	20%
Efficiency	0%	1%	5%	20%
Renewable Distributed Energy	5%	20%	50%	60%

Building a Portfolio of Renewables: Yes, the Big Two are Intermittent

- Solar
  - Utility-scale, desert variety
  - Rooftop Net Energy Metered systems
  - Community Solar
- Wind
  - Coastal, early morning, late afternoon
  - Intercontinental, night-time
  - Off-shore, all the time!
- Geothermal… Controllable capacity
- Hydro… Controllable capacity
- Biomass… Controllable capacity

Hanover Olympic “Super Green” apartments in LA

The Role of Storage

- Castaic… a hugely great resource
  - 1,500 MW/7,500 MWh
- Goal to Double Capacity
  - Have 10% of total capacity in storage
  - No large sites to develop; therefore DS
  - Goal to be national leader is “distributed storage”
- The Critical Storage Role
  - Provides for duck curve and other mismatches
  - Provides for frequency control now provided by conventional generators

Electrification – Unstoppable?

- The rhetoric is almost – prophetic
- The Tremendous Potential of Renewables
  - At negative marginal cost
  - Giving rise to successful Community Choice (CCAs)
  - Who would have “thunk” we’d have a duck curve?
- LA is bullish on the Dodgers and Electrification
  - Evs, more than any other city
  - Now eBuses (LA 2,000+ buses)
  - Even electrifying hot water heating/space heating
- Electrification
  - Winning the race with hydrogen for mobility
  - Overcoming the “power to gas” strategy
    - Decarbonized gas system, infrastructure value of using green gas

Increasing Efficiency by 20x

- New Construction; Retrofit Ordinances
  - Codes, standards, ordinances, mandates
  - (1-2% per year turnover)
- Traditional Retrofit DSM
  - Building and appliance standards
  - Loans and rebates, prescriptive and custom
  - Upstream incentives
- New Forms to Achieve a Quantum Jump in Results
  - Integrated designs, deep energy retrofits
  - ZNE, comprehensive programs
  - Financing: PACE, Energy Savings Agreements (ESAs)
  - Existing Building Energy and Water Efficiency Ordinance

The Efficiency Challenge

- The Current Efficiency Status
  - Efficiency: 1.4% of 2014 LADWP sales; 312.5 GWh
  - Nationwide, utilities are saving 0.3 – 1% and spending 1 – 3% of gross revenues doing so
- Political Targets
  - Mayor Garcetti calling for 15% savings
  - Mitchell Schwartz for Mayor, 20% savings
- To reach “stretch goals,” there’s a need to Envision New Models for Ubiquitous Efficiency

Let's Get Started -- Strategies

Pricing Options – the bottom line

- Time of use pricing
  - Only 1% of residential accounts in 2010
  - 99% on "time invariant" flat pricing
  - If GWP had TOU, I would have batteries!
- Real time pricing
- Congestion pricing
- Demand charges for all (Italian model)

Keep the Focus on the Future

- **Real Education and Awareness**
  - Renewables will be challenging to develop, finite sites, concerns, etc.
  - But can we make the case for efficiency?
    - This is a BIG opportunity
    - The on-off switch still rules in cost effectiveness
    - Efficiency is the least cost resource
  - Living within our carrying capacity by nurturing a conservation ethic feels good and nurtures a great society!

The Emissions Time Bomb!

Quantum-Leap Strategies

1. End-Use Pricing
   - Illuministes, chauffagists, street lighting services; selling light, heat, coolth, torque, etc.
   - Puts the onus on energy provider to maximize cost-effective efficiency
   - Puts energy efficiency in the hands of energy professionals
   - A “full-service approach,” Managed Energy Savings Agreements

2. Energy Budgets (like transportation credits)
   - Mini cap and trade
   - Millbrook’s faculty housing
   - Victory gardens??
   - Could be carbon budgets! (I MT/capita, then degresses)

More Quantum-Leap Strategies

3. Tear Down “Totaled Properties” Rebuild Green
   - Is it short-sighted to retrofit infrastructure well past its useful life?
   - Are we putting lipstick on pigs?
     - “Gone” infrastructure, lead pipes, no insulation, old heating systems, lead paints, poor ventilation, illogical orientation
4. New Utility Ownership Positions (housing/Evs)
   - Sell and/or manage housing marked by deep efficiency, carbon emissions reductions
   - Coordinated with electric, gas, water, transportation, waste management, food systems
   - Utilities to sell/service EVs; enables V2G

Conclusion and Low-Hanging Fruit

Treating Efficiency and Conservation like Fruit

- Fruit orchards are picked several times per harvest to gather the most ripe fruit
- In contrast, energy efficiency programs tend to sweep through once, a tech fix
- We grab only low-hanging fruit and leaving much value stranded higher in the tree
- LA's Existing Building Ordinance requires 5-year tune-ups… this is a step in the right direction!
- How can we assure deep penetration?

Cities Across the Country will Rely on Efficiency to Reach Their Goals They Rely on You and Your Ingenuity.

Ted Flanigan
President, EcoMotion
TFlanigan@EcoMotion.us
www.EcoMotion.us