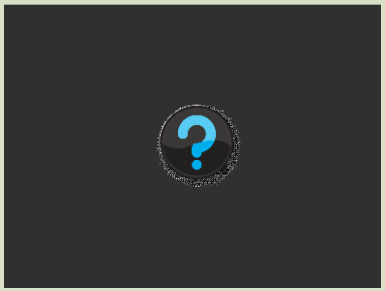
1913

1940

2007



2077

Austin Heat Island Mitigation

Norman Muraya, PE, CEM, CMVP

Energy Efficiency Services, Urban Heat Island Initiative, Austin Climate Protection Program, Austin Green Building Program

HI Mitigation Implementation

- **Green Roof Advisory Council**
- **Wind -Avoid Engine Heat:**

  Elec Vehicle (800) + Thermal Storage
- **Absorb and Use Solar :**

  Tree Folks + Solar Roofing – 1 million SF
- **Green Building Ratings**
- **Cool Roofs: Reflective Roof – Market Transformation**

  Code required

  Commercial EE Rebates

Green Roof Advisory Council

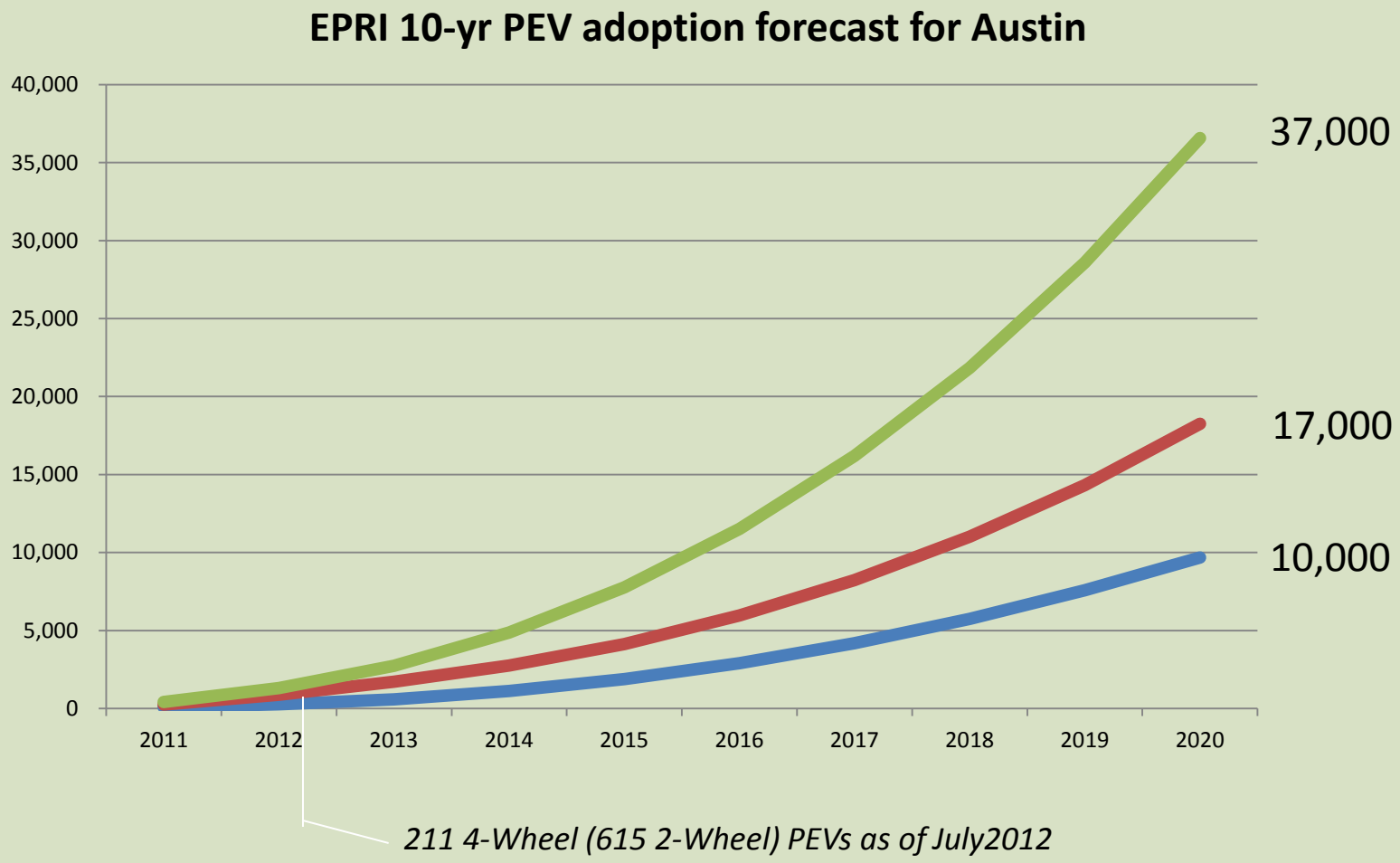
Absorb and use solar energy

Insufficient Water Solution: Avg single SF home 5 to 20 gal/d a/c condensate

Energy and Storm water credits (Construction permits)

Austin City Hall

Wind Powered Electric Vehicles



Tree Folks

- 3600 Trees/yr
- Deciduous trees in South and Southwest save up to 25% of the household energy - DOE

- **Shaded Parking Ordinance (15 yrs for new lots)**

50% Canopy Coverage, minimum of 80% native large shade. Tree within 50-feet of a parking space.

Solar PV Roofs

Absorb and use Solar heat

Shade Roof, Reduce Power Plant Heat

- 2012: 40 MW is 4 million SF of shading
- 2020: 200 MW Solar, 10 million SF in CBD
- Municipal: 80,000 SF on 45 buildings

Source: Inhabitat.com

Fulfill the IECC reflective roofing requirements for all new and remodeled building with green roofs and/or photovoltaics.

City Ordinance 20100408-051 www.ci.austin.tx.us/edims/document.cfm?id=135892

Green Building LEED Ratings

Commercial and Multi-Family – 7,900 MWh/yr

OPTION 1 – 50% of Site hardscape

- Vegetated open-grid pavement system (>50% pervious).
- High-albedo paving materials >25% Solar Reflectance .
- Vegetative shading

OPTION 2 - 50% parking underground or structured deck (top > 29 SRI)

Cool Roofs -Austin

- Market Transformation: 5% to 75% R
- Code: 100% New & Existing
- 1.4% of commercial Rebates : Spray-on
- Extend roof life by 3 times

Grant –Texas Energy Office

- 2003: pavements 40% of land cover, Roofs black rubber
- Double Rebates $0.15 to $0.30/SF
- 262,000 SF 300% increase
- IPMVP modeling with eQUEST
- 180,000 kWh/yr , 330 kW

Code Adoption

- 2008 Code: (IECC2006) + local amendments
- Commercial new and re-roofs
- 70% Reflectivity, or vegetative roofs, roof top pools, or solar PV
- Support: New construction less leak + cost effective
- Resistance : Existing re-roof + foreground reflectance
- Residential composition shingles rough and unreflective

Roof Conversions

- Existing:

  Black Rubber Membrane Built-up roof -5% Reflectivity

  + Ballasted

- New: White reflective > 75%

  TPO + Spray-on

  Rigid insulation +TPO stretch, 10 yr warranty

Cool Roof Results

- LBNL DOE study in Austin

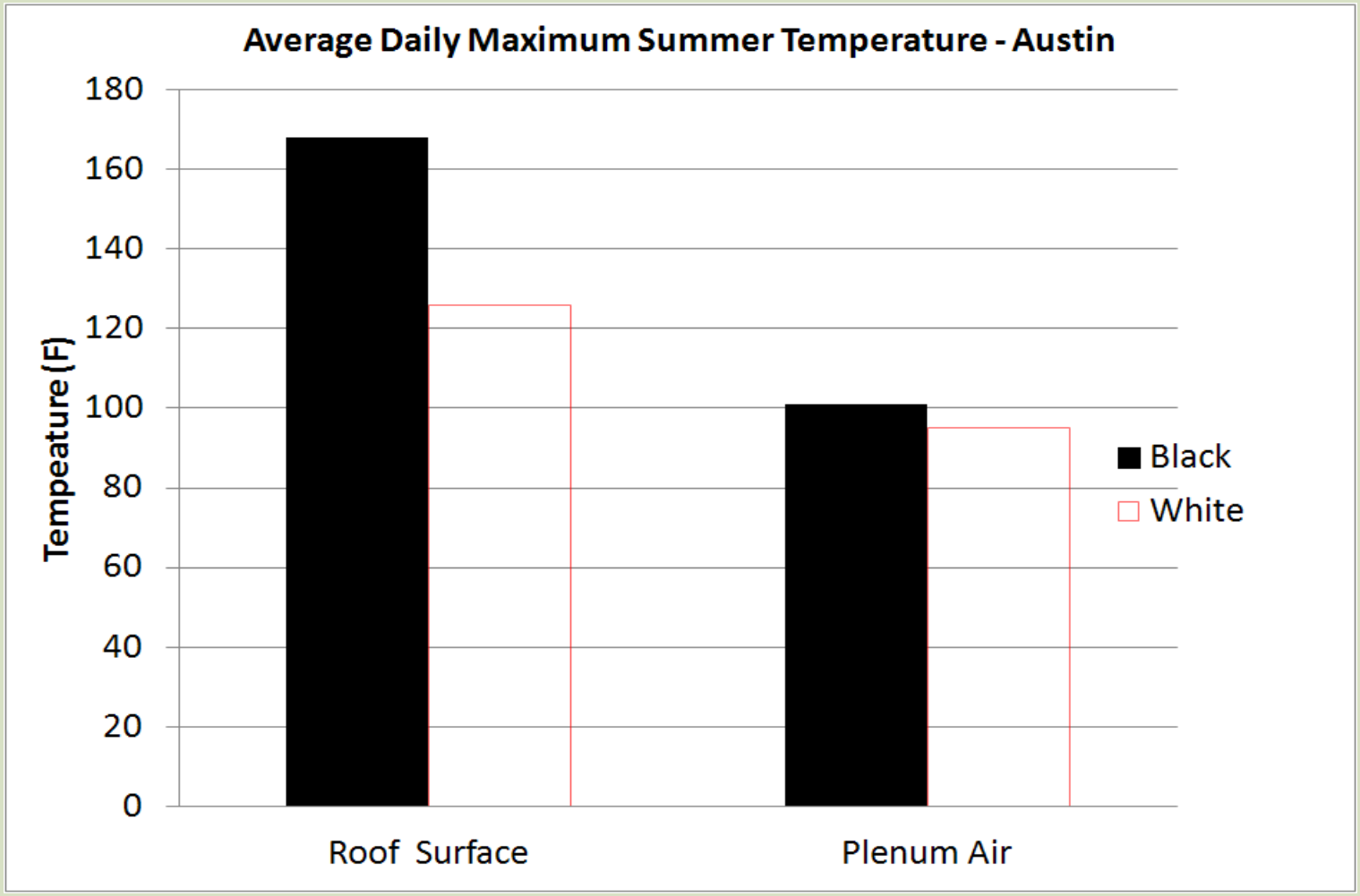
  Loads, energy consumption, emissions, and costs

- Function of

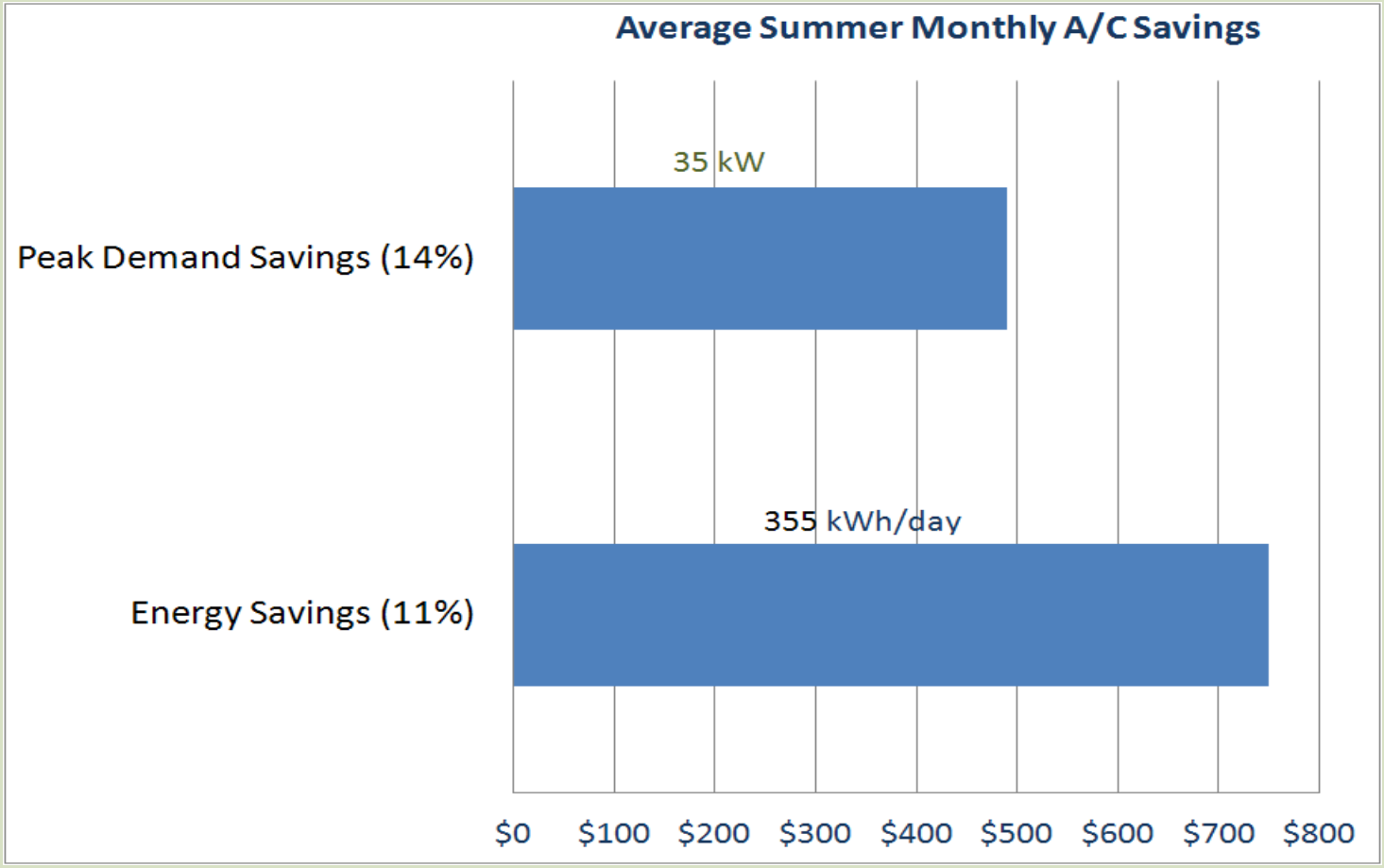
  Building type, roof insulation, ventilation roof/ceiling,

  a/c size, efficiency, & albedo.

Roof Results



Roof Results



Replication in other Cities

- Multi- facet, continuous
- Code adoption
- Community + contractor education
- Visual temperature readings
- Incentives