Section 2

A National Urban Electromagnetic Monitoring Program: Radiofrequency, Microwave and Low-Frequency Fields, with Brickell, Miami (2020-2026), and Doral, Florida (2022), as Reference Cases

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Scope: radiofrequency and microwave fields from 88 MHz to the millimeter-wave bands, and 50/60 Hz electric and magnetic fields from power lines, transformers, substations and wiring; instrument limitations are in Section 1. **RFI questions answered:** 4(l), 5, 5(n), 5(o), 7, 8, 9, 10(c), 11(a), 11(e), 12, 13(a) to 13(e), 13(g) to 13(i), 15(a) to 15(d), 16, 17 and 17(b), each tagged in brackets where answered.

OUR PROPOSAL

EFEIA proposes to establish, in collaboration with the competent federal authorities, an independent national electromagnetic monitoring program for urban environments that covers both the radiofrequency and microwave fields of telecommunications and the low-frequency electric and magnetic fields associated with urban electrical infrastructure, with Brickell, Miami (2020-2026), and Doral, Florida (2022), as reference cases.

The program should include standardized measurement procedures for each type of exposure, continuous sensors, repeated measurement routes, periodic assessments, identification of priority areas such as schools, childcare centers and health-care facilities, and reproducible protocols that can be implemented nationwide; it should publish open data and begin with a 12-month pilot in Miami and two to four other U.S. cities.

1 SUMMARY OF THE ISSUE [Q10(c)]

The program would show how radiofrequency and power-grid fields vary across each city and over time, and where they are highest. EFEIA's surveys of Brickell (2020-2026) and Doral (2022) are the reference cases.

1. Radiofrequency exposure is rising, most clearly at the upper end. In Brickell, between the maximum-hold surveys of July 2024 and September 2026, the median rose 12.4%, the 95th percentile 70.1% and the maximum 57.8%, and signals at 24 to 40 GHz went from not detected to detected (F1) [1]. Melbourne's 95th percentile and France's national median have also risen [2,3].

2. Power-grid fields near homes, schools and clinics go unmeasured. IARC classifies ELF magnetic fields as possibly carcinogenic (Group 2B) on limited evidence for childhood leukemia [4], an association seen at time-averaged fields above 0.3 to 0.4 μT [5,6]. In Doral, spot maxima reached 3.11 μT (31.1 mG) at a substation and 2.76 μT in a public dog park the investigator associates with high-voltage lines (F5) [7].

3. The United States monitors neither. We found no federal program that measures ambient radiofrequency exposure over time; the last federal survey, in the 1970s, covered broadcast bands only [8,9]. No federal limit or program covers 50/60 Hz fields in homes, schools or hospitals, and the last national survey dates from 1998 [10].

[Q5] 4. A program is feasible now. France made 2,373 accredited measurements in 2024, with a 6 V/m attention threshold exceeded at 3.8% of points [3], and maps more than 46,000 results [11]; Greece has run continuous sensors since 2003 [12]; Switzerland monitors ELF fields and sets a 1 μT installation limit at places of sensitive use [13,14]; ITU-T K.83 sets out the method [15].

What EFEIA asks of HHS. Name urban electromagnetic monitoring, radiofrequency and low-frequency, as a priority; convene EPA, NIST, NTIA, the FCC and NIEHS on governance; and support a 12-month pilot in Miami (Brickell and Doral) and two to four other cities, with EFEIA as technical collaborator (Part 7, Table 6).

Compliance is not protection. The radiofrequency limits address tissue heating averaged over 30 minutes [16,17], not non-thermal effects, polarization, combined sources, or how close and how long

people are exposed [18]. The 50/60 Hz levels prevent acute nerve stimulation [19,20]: the ICNIRP public level, 200 μT, is 500 times (calculated) the 0.4 μT at which the leukemia association appears [19]. Brickell values are well below the FCC limits, and they still rose.

2 WHY IT MATTERS [Q11(a), Q12, Q15(b)]

Exposure is not uniform. Mean radiofrequency levels in New York City in 2024 were 1.421 V/m in Manhattan and 0.297 V/m on Staten Island [21]; Brickell window maxima spanned a 38-fold range (calculated) within about 0.08 km² [1]. A city average hides the streets, homes and schools with the highest levels, and sources are multiplying: the FCC opened 5.925 to 7.125 GHz to unlicensed devices in 2020 [22] (Table 3).

[Q11(a)] Children spend their hours where these fields are. In the EMF RAPID survey, 3.6% of randomly selected U.S. residents had 24-hour average exposures above 0.4 μT [10]; WHO estimates that 1% to 4% of children have mean exposures above 0.3 μT [23]; in one U.S. neonatal unit an empty incubator read 1.5 to 12.7 mG at mattress level against a unit background below 0.5 mG [24].

Federal decisions need measured exposure. The FCC is taking comment on the D.C. Circuit remand [25], and this RFI asks whether environmental monitoring should be developed [26]. A higher level near a school is a reason to assess further, not by itself evidence of harm.

3 CURRENT LIMITATION OR GAP [Q10(c), Q5(o)]

Table 1. Federal activities that bear on radiofrequency and low-frequency fields.

Activity (who)	What it does	Ambient exposure measured over time?
Radiofrequency limits (FCC)	47 CFR 1.1310, adopted 1996 from a 4 W/kg heating threshold, averaged over 30 min for the public [16]	No; a benchmark
Evaluation and compliance (applicants, licensees)	Exemption or evaluation under 47 CFR 1.1307(b), data only on FCC request [27]; OET Bulletin 65 single-site methods, no required periodic testing [9,16]	No; one site, a time-averaged snapshot
Spectrum monitoring (NTIA ITS)	Measures spectrum occupancy [28]	No; occupancy, not exposure; infrastructure reusable
50/60 Hz fields (no federal agency)	No federal limit; state rules cover transmission-line rights-of-way only, Florida 150 to 250 mG at the edge [29]	No; last national survey 1998 [10]
Continuous environmental monitoring	EPA does not regulate RF from phones and transmitters [30]; a 2025 review finds no U.S. program [9]; the five European networks reviewed start at 100 kHz or above [31]	**None found: the gap this proposal fills**

G1. No recurring federal measurement of ambient exposure, radiofrequency or low-frequency (Table 1) [9,27,28,30]; state and municipal efforts were not surveyed. **G2. U.S. data are sparse:** two single-city radiofrequency studies [21,32], no national magnetic-field survey since 1998 [10], and apart from Brickell no same-site time series.

[Q13(a), Q13(c)] G3. Surveys stop below the newest bands. Exposimeter surveys end at or below 6 GHz [21,33,34], below the 6 GHz Wi-Fi band [22] and far below millimeter-wave 5G; in 2026 Brickell's 24 to 40 GHz detector recorded a signal it could not attribute to a source [1].

[Q11(a), Q15(a)] G4. No U.S. data at schools, childcare centers, clinics or neonatal units [21,32]. Greece measured radiofrequency in 661 schools [35]; Israel reported at least one classroom above 0.4 μT in more than 60% of schools (1,500 measurement reports published, of 4,800 schools) [36].

[Q8] G5. Averages and spot readings hide what matters. In Brickell the window maxima averaged about 5.4 times the live-display readings of the same survey (ratio of means, calculated) [1]; a spot reading of a 50/60 Hz field may not represent the time-averaged field, and one residential study added a 24-hour bedroom recording to its spot measurements to estimate it [37]. Section 1 sets out the instrument limitations behind this.

G6. Wiring faults are invisible to inspection. Of 21 UK homes at or above 0.4 μT, 57% of exposures were attributed to low-voltage sources, including 33% to suspected wiring faults or net currents in service cables [38];

the National Electrical Code prohibits objectionable current [39], but routine inspection measures neither field nor net current. **G7. Low-frequency electric fields are almost unstudied:** IARC found the evidence inadequate (Group 3), which is not evidence of safety [4]. **G8. Community concern has no measurement pathway:** EFEIA has found no U.S. protocol for a resident's concern about a nearby installation, and assessments prompted by antennas usually cover radiofrequency only (F7).

4 EXISTING EVIDENCE [Q7, Q12, Q15(b) to Q15(d)]

F1. Brickell, Miami, 2020 to 2026: the radiofrequency reference case (EFEIA field campaigns; grade (b)) [1]. EFEIA surveyed the same corridor around the Miami River and Brickell Avenue (about 0.08 km²) on 15 November 2020 (30 spot readings), 14 July 2024 (10 maximum-hold windows) and 20 September 2026 (13 windows reset about every five minutes, with a second meter on live display), covering 10 MHz to 8 GHz plus a detector labeled 24 to 40 GHz, on Sundays and away from nearby transmitters.

Table 2. Brickell corridor, μW/cm² (1 μW/cm² = 10 mW/m²). 2020: spot readings; 2024 and 2026: highest value retained per window, so 2020 is not a replicate. Source: [1]; percentage changes as printed there.

Indicator	Nov 2020 (n = 30)	Jul 2024 (n = 10)	Sep 2026 (n = 13)	2024 to 2026 (same capture mode)	2020 to 2026 (mode differs)
First quartile	0.943	2.637	4.009	+52.0%	+325.1%
Median	**2.854**	**6.979**	**7.841**	**+12.4%**	**+174.8%**
95th percentile	**6.522**	**19.298**	**32.834**	**+70.1%**	**+403.5%**
Maximum	**9.639**	**22.430**	**35.390**	**+57.8%**	**+267.2%**
Values of 10 μW/cm² or more	0 of 30	5 of 10	5 of 13		

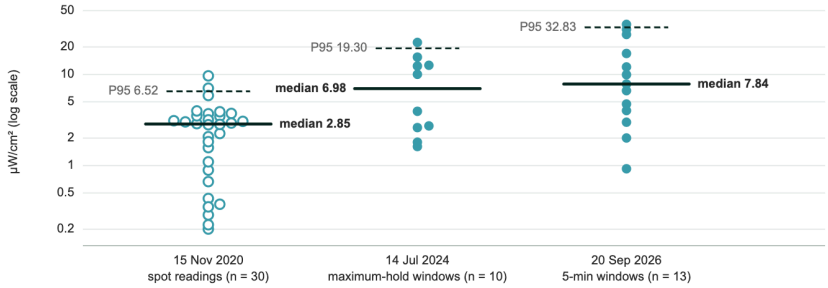


Figure 1. Brickell readings and windows by survey, μW/cm², log scale; lines: median (solid) and 95th percentile (dashed). Source: [1].

What the record shows. On equal capture terms, 2024 to 2026, the maximum reached 35.39 μW/cm² (353.9 mW/m², about 11.6 V/m, conversion). The rise lies in recurrent high events: in 2026 the 47 live readings had a median of 28.77 mW/m², against 78.41 mW/m² for the 13 window maxima. At 24 to 40 GHz nothing was detected in 2024; in 2026 peaks reached 178 μW/m² and a retained maximum 4,990 μW/m², source not identified. **What it does not show.** All values are well below the FCC limits; the 2026 maximum is 18% of the strictest (calculated) [16]. Readings are not separated by band or source, the 2024 windows lack coordinates, and the report includes no calibration certificates.

F2. Averages hold while the upper tail rises (emerging): Swiss means were flat from 2014 to 2021 [33] while Melbourne's 95th percentile rose [2]. **[Q15(c), Q15(d)] F3. Density and small cells shape exposure (emerging).** Median levels across networks follow population density [31]; near 5G small cells at maximum output the exposure ratio reached 0.68 of the ICNIRP public limit at 1.3 m, falling steeply with distance [40]. No U.S. study has measured homes near small cells.

[Q13(a) to Q13(e), Q13(g) to Q13(i)] F4. Sources differ in frequency, time structure and what sets the field (Table 3).

Table 3. Urban source classes the program must separate.

Source class	Frequency	What sets the exposure, with evidence
Broadcast and public-safety radio	FM, VHF and UHF television; public-safety bands	Continuous broadcast, the only class in the 1970s survey [8]; intermittent public-safety use
Base stations, small cells, handsets	Below 6 GHz; millimeter-wave 5G bands	Traffic-dependent and beamformed; the user's own phone dominates: maximum-uplink mean 26.32 against 1.10 mW/m² as a non-user [34]
Wi-Fi, IoT, smart-city nodes	2.4, 5 and 5.925-7.125 GHz [22]	Packet bursts
Radar, satellite terminals	Radar bands; satellite uplink 14.0-14.5 GHz [41]	Pulsed rotating beam diluted by time averaging; 7.92 V/m at 50 cm above a dish [41]
Candidate 6G bands	4.4-4.8, 7.125-8.4 and 14.8-15.35 GHz under study for WRC-27 [42]	Not yet in service: a baseline can be measured now
High-voltage lines, substations	50/60 Hz	Load and distance: 43% of UK home exposures at 0.4 μT or more [38]
Distribution lines, service drops, building wiring	50/60 Hz	Low-voltage sources: 57% of UK home exposures at 0.4 μT or more, including 33% attributed to suspected wiring faults or net currents [38]
Transformers	50/60 Hz	Apartments above indoor transformer stations averaged 0.62 μT against 0.11 to 0.21 μT in reference apartments [37]
Appliances, EV charging, vehicles	Induction cookers about 20 to 30 kHz [43]; EV charging 2-150 kHz [44]	Charging sites at 100 to 114 dBμV within normative limits [44]; in vehicles, exceedances at the feet in hard acceleration, up to 201% in one model [45]

F5. Doral, Florida, 2022: the low-frequency reference case (EFEIA field assessment; grade (b)) [7]. EFEIA measured 45 selected locations, including schools, a hospital and a substation, with exploratory meters (209 electric, 141 magnetic and 267 radiofrequency records after duplicate removal). Nine location maxima (20%) were 100 V/m or more and seven (15.6%) 5 mG (0.5 μT, conversion) or more, against medians of 19 V/m and 0.7 mG. The highest radiofrequency reading, 0.63 μW/cm² (6.3 mW/m², conversion), fell in the meter's 5 and 6 GHz grouping, which the investigator attributes to Wi-Fi.

Table 4. Doral 2022: selected location maxima (spot values; settings as described by the investigator; μT by conversion). Source: [7].

Location (setting)	Electric field, V/m	Magnetic flux density, mG (μT)
Substation	200	31.1 (3.11)
Dog park (public recreation, near lines)	200	27.6 (2.76)
Landmark (residential surroundings)	200	25.5 (2.55)
Doral High School (school)	95	9.3 (0.93)
Baptist Hospital (health care)	107	2.3 (0.23)
Median of the 45 location maxima	**19**	**0.7 (0.07)**

What the record shows. High readings were not confined to the substation, and electric and magnetic fields differed sharply at the same site (Las Vistas: 141 V/m, 0.8 mG). **What it does not show.** Spot maxima cannot be set against the time-averaged 0.4 μT cutpoint. The report gives no complete dated schedule, coordinates, source distances or calibration certificates, does not establish whether the repeated 200 V/m values reflect the

meter's display limit, and supports no causal or compliance conclusion.

[Q11(a), Q11(e), Q12] F6. The childhood leukemia association above 0.4 μT persists but has weakened (association established; causation not established). The pooled relative risk at 0.4 μT or more was 2.00 (95% CI 1.27-3.13) [5]; a later meta-analysis gives an odds ratio of 1.37 (1.05-1.80), with all-metric estimates of 1.51 before 2000 and 1.04 after [6]; near lines of 200 kV or more the excess was not explained by high magnetic fields [46]. SCHEER rates the evidence weak overall and moderate for occupational ALS [47]; in workers the relative risk of ALS was 1.26 (1.07-1.50) [48]. *Neonatal care (emerging):* in preterm infants grounding cut 60 Hz skin potential by more than 95% and raised vagal tone by 67%; device from Earthing.Com Inc. (noted, not downgraded) [24].

F7. Community inquiries. EFEIA has received inquiries from residents concerned about telecommunications infrastructure, especially 5G. At the same addresses its measurements also identified distribution lines, transformers and building wiring that merit evaluation, so one assessment must cover both field types (P8).

5 WHAT EFEIA CAN CONTRIBUTE [Q4(l), Q7, Q17]

EFEIA offers to serve as technical collaborator from design to pilot: the Brickell surveys (53 spot readings and maximum-hold windows, and 47 live-display readings in 2026) as the radiofrequency baseline [1]; the Doral 2022 location data as the low-frequency baseline [7]; draft measurement and reporting protocols for review with NIST and EPA; its BEMCP framework and licensed professional network for field teams; and its reference proposal for a national monitoring plan [49]. **[Q4(l)]** Each program dataset will record instrument, serial number and calibration, frequency coverage, detector, averaging time, height, position, distance to sources, grounding, statistics and expanded uncertainty, following IEEE C95.3-2021 [50]. **Independence.** EFEIA operates within the NOXTAK ecosystem, which develops the SPIRO mitigation technology; methods, calibration records and raw data will be published, and quality assurance sits with the program partners (P2).

6 ADDITIONAL RESEARCH NEEDED [Q5(o), Q7, Q8, Q16]

R1. Field methods for peaks, duty cycle and crest factor. **R2.** NIST-traceable instruments above 6 GHz (G3). **R3.** Indoor exposure against street-level readings. **R4.** Population-weighted exposure where people live, study and sleep. **R5.** Baselines in candidate 6G bands and on satellite links before wide deployment [41,42]. **R6.** Duration and origin of the Brickell high events, by synchronized, frequency-selective capture [1]. **R7.** A national survey of homes, schools and childcare settings with 24-hour logging, updating EMF RAPID [10,13]. **R8.** Fields at sensitive-use sites by distance and voltage class of nearby sources. **R9.** What correcting objectionable current achieves, and at what cost [38,39]. **R10.** Electric field, net current and intermittency, to re-examine pooled leukemia data [46]. **R11.** Incubator fields and a randomized, blinded replication of the neonatal grounding findings [24]. **R12.** Pooled occupational ALS data with quantitative exposure [47,48].

7 THE PROPOSED PROGRAM [Q5(n), Q9, Q10(c), Q16, Q17]

P1. Objective and scope. Measure, map and publish exposure by band, source type and time: radiofrequency from 88 MHz to 40 GHz in phase 1, extendable toward 300 GHz [17], and 50/60 Hz magnetic and electric fields, outdoors, at priority sites and, with consent, indoors. **[Q17, Q17(b)] P2. Governance and independence.** HHS leads through OASH, with NIEHS for research use and a national low-frequency survey succeeding EMF RAPID [10]; EPA brings monitoring practice, NIST calibration traceability, NTIA ITS its sensor infrastructure [28] and the FCC site data [25]. Operators and utilities provide data but do not perform, fund or publish measurements; collaborators follow one published protocol with independent quality assurance.

[Q7, Q8] P3. A method for each type of exposure (Table 5). Every record carries position, height, calibration and uncertainty.

Table 5. Measurement methods by type of exposure.

Exposure	Method	Reference practice	Reported
Radiofrequency, area trends	Tier A: continuous fixed sensors	ITU-T K.83 [15]	Per-band time series
Radiofrequency, routes	Tier B: repeated route surveys	Swiss and European protocols [33,34]	Median, 95th percentile, maximum
Radiofrequency, priority sites	Tier C: frequency-selective spot measurements, peak-hold and time-averaged, to 40 GHz	IEC 62232:2025 [51]	V/m and mW/m² per band and source

Exposure	Method	Reference practice	Reported
50/60 Hz magnetic field	24-hour logging; distance profiles from lines, transformers and substations; load and harmonics recorded	IEEE C95.3-2021 [50]	Time-weighted average; time above 0.2, 0.3 and 0.4 μT
50/60 Hz electric field	Spot measurement at fixed height; meter range checked at high values	IEEE C95.3-2021 [50]	V/m; out-of-range values flagged
Wiring and grounding	Net-current check at the service entrance, schools first	NEC 250.6 [39]	Net current; fields before and after correction

[Q15(a), Q11(a)] P4. Where to measure first. A citywide grid by land use; schools, childcare centers, clinics and neonatal units, first those within 50 m of lines of 200 kV or more (the band of the pooled analysis [46]), next to substations or beside transformers; dense blocks near small cells; transit hubs; districts near radar. Proximity selects the site; measurement decides the finding; wiring faults behind elevated fields are corrected, a very low-cost measure consistent with WHO advice [23]. In Miami the first points follow the Brickell report's recommendations [1] and the Doral priority locations, among them the substation, dog park, Doral High School and Baptist Hospital [7].

P5. Phases (Table 6).

Table 6. Program phases.

Phase	Months	Work	Output
0. Design	1-3	Governance, protocols by type of exposure, calibration chain, open-data standard; Brickell route repeated at fixed points; Doral dataset completed with calibration certificates and the field data records	Published protocols; Brickell and Doral baselines
1. Pilot	4-15	Miami (Brickell and Doral) and two to four cities of different density: sensor network on the Antwerp scale (10 fixed and 4 mobile nodes) [52], quarterly routes, Tier C and 24-hour logging at priority sites, wiring corrections with fields before and after	Pilot report, open data, cost per city, whether proximity predicted the fields
2. Expansion	16-36	More metropolitan areas; monitoring interval agreed with the FCC and EPA; public map	Multi-city baseline; public map
3. Steady state	Year 4 on	Continuous Tier A, periodic routes and low-frequency surveys, re-measurement as new bands deploy	Annual national report

[Q9] P6. Open data for residents and local governments. Results go on a public map with metadata; for each base station and small cell, residents need location, operator, bands, maximum power, antenna direction and the latest nearby measurement, as on France's Cartoradio [11]. Federal law bars local regulation of siting on RF-emission grounds when facilities comply [53], so disclosure and independent measurement are the tools left. Magnetic fields are reported as the share of children above 0.2, 0.3 and 0.4 μT.

[Q16] P7. Expected results. A measured U.S. baseline replacing a 1970s broadcast-only estimate [8] and a 1998 magnetic-field survey [10]; a Brickell time series comparable with Europe [3,12,33]; levels at schools, clinics and neonatal units; and exposure data for HHS research and the FCC remand [25,26].

[Q9] P8. One protocol for community inquiries. When residents raise a concern about a nearby installation, 5G or otherwise, the assessment measures both radiofrequency and low-frequency fields, attributes each level to its source and reads it against named criteria (FCC limits, ICNIRP 2010, the 0.4 μT cutpoint), stating what it cannot conclude [6,16,19].

Related: Sections 1 (instruments), 3 (health conditions and EHS) and 6 (assumptions behind the limits).

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