Data Center Real Estate and Land Development in CEE: Investment Trends and Outlook

Executive Summary

Central and Eastern Europe (CEE) has become a focal point for data center **real estate investment** as demand shifts eastward from saturated Western hubs. In this second part of the analysis, we examine how **land development and property strategies** are shaping the region's data center boom. Key findings include:

- **Surging Land Acquisition:** Major developers and operators are **land banking** strategic sites across CEE, often **18–36 months ahead** of construction. Notable transactions in 2024–2025 include Vantage securing 12 acres in Warsaw for a 48 MW campus, Data4 buying 4 ha near Warsaw for a 60 MW park, Hillwood assembling 40 ha outside Warsaw for a 130 MW project, and CRA acquiring a Prague site for 26 MW[1]. This forward positioning signals strong confidence in **long-term regional demand**.

- **Diverse Developer Strategies:** A mix of **global operators**, regional real estate firms, and local players are driving campus development. Global data center specialists (e.g. Vantage, Equinix, Digital Realty) are expanding footprints or partnering for CEE projects, while regional developers like Portland Trust and **telecom-backed firms** (CRA, Slovak Telekom) leverage local expertise. Local incumbents (Atman, Beyond.pl, ClusterPower) are **scaling up existing sites** to compete. These strategies range from **build-to-suit hyperscaler campuses** to **speculative multi-tenant parks**.

- **Evolving Investment Models:** New financing structures underpin CEE's data center growth. Joint ventures and platform investments are common – for instance, GIC's €1.4 billion investment into Vantage's EMEA platform[2] and **partnerships between tech firms and real estate developers** (e.g. Boosteroid's cloud gaming JV with DL Invest Group to develop 20–40 MW sites[3]). Both **lease models and owner-operated facilities** co-exist: some hyperscalers lease from campus developers, while others invest directly in land for self-build. Speculative builds are emerging in anticipation of hyperscaler entry, though many projects still secure an **anchor tenant** before breaking ground.

- **Prime Site Selection Criteria:** Access to **high-capacity power grids** and **fiber connectivity** are paramount in site selection. Data center investors target locations near robust electrical infrastructure (or plan on-site generation) and multiple fiber routes to ensure low-latency connectivity. Many CEE sites are chosen for proximity to **Western Europe's networks** (e.g. Prague and Bratislava for Vienna connectivity[4][5]) or regional population centers. **Tax incentives and Special Economic Zones (SEZs)** also influence site decisions – for example, Poland's **Investment Zone** offers up to 50–70% tax exemptions on qualifying

investments[6][7], and designated **data center parks** with pre-zoned land and infrastructure are being promoted in countries like Romania[8]. Typically, modern campus projects require parcels of **2–5 hectares or more** to allow phased expansion[9].

- **Regulatory Landscape: Permitting and grid approvals** remain a critical challenge in some CEE markets. Poland has streamlined processes (especially within SEZs) and actively courts data centers with incentives[10]. In contrast, the Czech Republic's bureaucracy has proven problematic – Microsoft canceled a planned Prague region in 2023 after spending $64 million on land due to "complex bureaucracy and long wait times" for permits[11][12]. Romania and other EU members are working to fast-track digital infrastructure permits as part of post-pandemic reforms, but **grid bottlenecks** (e.g. multi-year waits for power in Prague[13]) and local opposition can delay projects. Countries like **Croatia** have also faced regulatory delays in expanding grid capacity (over €1 billion in renewables stalled awaiting clearer grid fee policies[14]), indirectly affecting data center power supply.

- **Incentives and Public-Private Support:** Governments in CEE are offering robust support frameworks. Poland's 14 special economic zones provide **real estate tax breaks, expedited permitting, and infrastructure support** for data center investments[10]. Romania's EU-funded **Recovery and Resilience Plan** devotes 21% of its €29 billion budget to digital transformation (including cloud infrastructure)[15], financing new government Tier IV data centers[16] and encouraging hyperscaler entry. Pan-regional initiatives like the Three Seas Fund have co-financed projects (e.g. Estonia's Greenergy Data Center)[17]. These incentives, combined with low corporate taxes (e.g. 16% in RO, 19% in PL) and R&D tax credits, substantially **improve project economics** for data center developers.

- **Construction Supply Chain Pressures:** The CEE data center build-out is navigating the same headwinds seen globally: **long lead times for critical equipment**, rising materials costs, and skilled labor shortages. Developers report delays of 12–24+ months for power transformers and switchgear – a global issue that can extend project timelines by **2–6 years** in extreme cases[18]. Construction inflation (steel, concrete) since 2021 has driven up costs, though moderating in 2024. Mitigation strategies include bulk procurement, modular designs, and tapping international contractors with specialized crews to maintain timelines.

- **Risk Mitigation Strategies:** Investors employ several tactics to de-risk CEE projects. To address **grid capacity delays**, some are deploying **on-site generation** (e.g. natural gas power at ClusterPower in Romania[19]) and **battery storage** to meet initial power needs[20]. Geographic diversification – building in secondary cities or across borders – is used to hedge against any single market's regulatory or grid risks. **Community outreach** and careful site buffering are increasingly important as local residents in Poland and elsewhere voice opposition to large campuses near homes[21][22]. Financially, developers hedge **currency risk** by structuring deals in Euro (Slovakia, Baltics, and now Croatia use the euro) or via FX hedges in PLN/CZK/RON markets. In the case of **Western Ukraine**, where long-horizon opportunities carry geopolitical risk, investors are exploring political risk insurance and guarantees from entities like DFC/MIGA[23] to enable phased development when the situation stabilizes.

- **Real Estate Market Impact:** The rapid expansion of data centers is starting to **reshape industrial real estate** in CEE. Large-scale campus projects are absorbing significant tracts of

industrial land, especially around Warsaw, Prague, and Bucharest, contributing to **land price appreciation** in tech-friendly zones. (For perspective, land values in London's Slough have spiked 40%+ since 2019 due to data center demand[24]; CEE markets are now beginning to feel similar pressure). Prime power-fed sites command premiums, potentially crowding out other industrial uses or pushing them to less grid-accessible areas. Local authorities see benefits in increased investment and tax base, but also face **zoning dilemmas** as residents and competing land uses react to the scale of data center developments. In Poland, multiple municipalities are now balancing the **economic benefits vs. community concerns** as 100+ MW campuses are proposed on city outskirts[25][22].

- **Comparative Outlook:** Compared to Western Europe's FLAP-D hubs, CEE offers **greater availability of land and power** at lower cost – a primary driver of its rise. Frankfurt, London, Amsterdam, Paris, and Dublin are constrained by power caps, moratoria, and soaring real estate costs (e.g. parts of West London have no new grid capacity until 2035[26]). CEE markets like Warsaw and Prague provide relief, although Warsaw is itself seeing grid strain and must expand to secondary sites[27]. The dynamic mirrors trends in the US, where **hyperscalers overflow** from Northern Virginia to regions like North Carolina and Ohio, attracted by cheaper land and state incentives[28]. Going forward, CEE is expected to sustain double-digit growth in data center supply, but success will depend on **continued coordination between developers, utilities, and governments** to ensure land, power, and permits keep pace with demand.

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Land Acquisition Trends Across CEE

Major Land Transactions and Development Pipelines

A clear indicator of confidence in CEE's data center market is the wave of **land acquisitions** by major players. Many deals are being struck well in advance of construction to secure strategic sites with the right power and location profiles. Table 1 highlights selected notable land transactions (2023–2025) that underscore these trends:

Table 1 – Selected Data Center Land Deals and Projects in CEE (2023–2025)

Developer (Origin)	Location (Project)	Land Acquired	Planned Capacity	Status (as of 2025)
Vantage Data Centers (US)	Warsaw–Bielany, Poland (campus)	~12 acres (≈4.8 ha)	48 MW	Land acquired; campus operational in 2024[29]
Data4 (France)	Jawczyce (Warsaw), Poland	4 ha	60 MW	Land acquired; under construction (phased 2024–25)[29]
Hillwood (US)	Reguły (Warsaw area), Poland	~40 ha	130 MW	Planning stage; local permitting ongoing[30][31]
České Radiokomunikace (CZ)	Prague–Zbraslav, Czech Rep.	(site not disclosed)	26 MW	Land acquired; construction in progress (target 2025–26)[32][33]
Digital Realty (US)	Near Bratislava, Slovakia	(undisclosed parcel)	TBD (hyperscale)	Land banked in 2024 for future development[34]
Portland Trust / Ares (CZ/US)	Bucharest (Preciziei), Romania	~4 ha	~20 MW (Phase 1)	Permit obtained 2024; phase 1 construction started[35]
FR Investment (PL)	Kajetany (Warsaw area), Poland	2 ha	17.6 MW	Planning; will sell land after securing permits[36]

Sources: DBS CEE Data Center Report[1][35]; DCD news reports[31][36]; company announcements.

These transactions reveal several patterns. **Poland dominates land activity**, reflecting its status as CEE's largest market. Around Warsaw, international operators have snapped up plots: Vantage's **12-acre purchase in Bielany** enabled its 48 MW campus (now fully operational)[29], while France's Data4 acquired 4 ha in nearby Jawczyce to build a €500 million, 60 MW campus[29]. Hillwood – a global logistics developer – is repurposing a **40 ha industrial site in Reguły** (southwest of Warsaw) into a four-building, 130 MW data center park[31]. This reflects a trend of **logistics-to-data center conversions**, leveraging existing land banks in strategic locations. Notably, Hillwood's project has faced **community resistance** due to its proximity (30 m) to residential areas[37], highlighting how large land take-ups can spark local pushback (discussed further below).

Elsewhere, **Czechia's first hyperscale-oriented site** was secured by telco České Radiokomunikace (CRA) in Prague's Zbraslav district. Despite Prague's bureaucratic hurdles, CRA (backed by Cordiant Digital Infrastructure) proceeded to acquire land and is constructing a 26 MW campus aimed at hyperscalers, slated for 2025–26 completion[33]. This suggests that **patient capital is positioning in Prague** in anticipation of reforms to speed up permits. In **Slovakia**, a noteworthy signal came in 2024 when **Digital Realty** quietly acquired a parcel outside Bratislava[34]. While details are scarce, this move by one of the world's largest data center REITs implies that even smaller CEE markets are on the radar for future hyperscale capacity – likely as **spillover/backup locations** for Vienna or to serve regional needs.

Romania is also seeing land investment for data centers, though often through **local joint ventures**. Portland Trust, a regional developer, purchased a 4 ha plot in Bucharest's Preciziei industrial area and obtained a building permit for a 20,000 m², ~20 MW data center in 2024[38][35]. This is part of Portland's broader strategy, backed by U.S. fund Ares, to develop **three sites in Bucharest (total ~90 MW) and one in Prague** for data centers[39]. Additionally, Bucharest's Vitan district saw Portland acquire and clear a brownfield site (former Transelectrica facility) to build another ~8 MW facility by end-2024[40]. These examples illustrate a **brownfield redevelopment trend** in urban areas: older industrial sites with grid connections are being repurposed into data centers, capitalizing on existing infrastructure.

Another model is emerging in Poland's suburbs: **land speculators who entitle plots for data centers** and then seek to offload them to operators. In Kajetany (near Warsaw), a local firm FR Investment secured a preliminary purchase of a 2 ha plot and is pursuing permits for a 17.6 MW data center, intending to sell the shovel-ready site thereafter[36]. This *develop-to-sell* approach indicates a nascent market for **turnkey data center sites** in CEE, where real estate players handle the early-stage zoning, environmental clearance, and utility connections, reducing lead time for incoming operators. It's essentially an extension of the land banking strategy – with value added by permit procurement.

Overall, **land acquisition volumes are highest in Poland and Romania**, consistent with their larger project pipelines. Poland's total land area in active DC projects likely exceeds 100 ha when aggregating all ongoing campuses, given the multi-site expansions around Warsaw, Poznań, and other cities. Romania's single largest project, the ClusterPower Technology Campus near Craiova, occupies about **25,400 m²** (2.54 ha) for its first phase and plans five buildings totaling 200 MW[41], with additional room for on-site power generation. While smaller in absolute terms, the Baltics have also seen land moves – e.g. Estonia's Greenergy Data Center (31.5 MW) was developed on a greenfield site outside Tallinn with backing from the Three Seas Initiative Fund[17].

Importantly, these land deals often precede actual compute demand by a few years. Many were executed **18–36 months before construction start** (or even before securing an anchor tenant)[42]. Such early positioning underscores the **"pipeline mentality"** of investors: securing scarce suitable land now to ensure capacity for the future. It also reflects rising competition – as Western European availability tightens, CEE plots with the right attributes (power, fiber, permits) are quickly becoming prized assets. This may lead to **appreciating land values** in key sub-markets; industry observers note that even in FLAP-D, land cost is a small fraction of total project cost, but skyrocketing prices (like $1–3k per m² in prime hubs) create higher barriers to entry[43]. CEE still offers land at a fraction of those costs, though Warsaw and Prague prices are climbing with each new deal

(anecdotal reports suggest well-located data center land in Warsaw now fetches **€1–1.5 million per MW of planned capacity**, compared to over €3 million per MW in Frankfurt[44]).

In summary, **robust land acquisition across CEE** signals a maturation of the market. International operators are locking in sites in core and secondary cities alike, regional developers are pivoting from offices/warehouses to data centers, and a supporting ecosystem of brokers, lawyers, and utility partners is developing around these transactions. The stage is set for a sustained building boom, provided that land can be converted to live capacity in a timely manner – an issue we turn to in examining developer strategies and regulatory factors.

Developer Strategies: Global, Regional, and Local Approaches

The CEE data center surge is being driven by a **diverse cast of developers** and investors, each with distinct strategies. Broadly, we can categorize them into **global multi-market operators, regional real estate developers, and local incumbent players**, though in practice their roles often overlap through partnerships. Below we explore each group's approach to campus development and land investment in CEE.

Global Players and Platform Investors

Global data center operators and consortia have increasingly set their sights on CEE as part of broader European expansion. These include well-known colocation and hyperscale specialists such as **Equinix, Digital Realty, CyrusOne, NTT, Vantage Data Centers, and EdgeConneX**, as well as the investment platforms backing them (sovereign wealth funds, infrastructure funds, etc.). Their strategies typically involve deploying capital into **large campus projects** in primary markets (like Warsaw) with potential to scale.

Several have entered via **acquisition or partnership**. For instance, *Digital Realty* (one of the world's largest DC REITs) made its first CEE foray by acquiring Croatia's Altus IT in 2021[45], instantly gaining a foothold in Zagreb (albeit a small 1,300 m² facility). This beachhead strategy allows it to learn the market and expand capacity gradually – Digital Realty is expected to upgrade and expand the Zagreb site, and its land purchase near Bratislava suggests future builds in Slovakia[34][45]. Similarly, *Equinix* entered Poland by acquiring the Warsaw assets of ATM (a leading Polish DC firm) back in 2018; Equinix now operates two IBX data centers in Warsaw and is reportedly evaluating further expansion[46].

Vantage Data Centers (US-based, backed by DigitalBridge and other investors) chose a different path: **ground-up development**. Vantage in 2020–21 announced a new Warsaw campus and subsequently formed a €2.5 billion joint venture in 2024 with PSP Investments and others to fuel expansion[2]. Vantage acquired land in Warsaw's Bielany district and built a 48 MW campus from scratch[29], now fully operational. This was one of the earliest hyperscale-oriented greenfields in CEE by a global player, and it attracted anchor tenants (reportedly including a major cloud provider) during its phased delivery[47][48]. Vantage's success in leasing up the campus helped validate the **"if you build it, they will come"** thesis for CEE.

Another example is **Data4** (a European operator owned by AXA IM), which chose Warsaw for its first foray outside Western Europe. Data4's planned 4-building campus in Jawczyce (60 MW) leverages its standardized design used in France and Italy, and benefits from a favorable location near power lines. By designing a campus up front and delivering in phases (first building by 2025), Data4 is taking a semi-speculative approach, banking on Warsaw's continued demand growth[49].

EdgeConneX provides a case of partnership with local developers: in Warsaw, EdgeConneX teamed with **Greykite and White Star Real Estate** to redevelop a former logistics site (the "Digital Ursus" project) into a 65 MW data center[50]. The local JV handled the real estate conversion and secured power, then **leased the facility long-term to EdgeConneX**[50]. This **build-to-lease model** allowed EdgeConneX (now part-owned by EQT) to expand in Poland without the burden of

owning land or managing construction directly – effectively outsourcing those pieces to specialists on the ground. It underscores how global operators often rely on **local partners for site development**, especially in markets with complex permitting.

Global hyperscalers (cloud providers) typically do not publicly lead their own real estate acquisitions in CEE, preferring to lease from these data center operators or pursue stealth land deals. An exception was **Microsoft's venture in Prague**, where it directly bought 7 ha of land in 2022 for a planned campus – only to abandon it due to permitting delays[11][51]. After that costly lesson, hyperscalers like AWS, Microsoft, and Google have been more inclined to **encourage their development partners** (e.g. via anchor leases or build-to-suit arrangements) rather than hold land on balance sheet in nascent markets. However, they remain the ultimate demand drivers: industry projections suggest AWS will eventually launch a region in CEE, which could instantly absorb tens of MW[52]. When that happens, the likely approach is via an experienced developer who has a **"shovel-ready" campus** prepared – reinforcing the need for proactive land banking by the developer community.

In summary, global players bring **capital and credibility**, and often set higher build standards (Tier III+/IV, sustainability features) in the CEE markets. They are focusing on Poland first (given its scale and existing cloud regions) and selectively branching into other countries via partnerships. Their strategy balances risk – teaming with local firms or acquiring existing assets for immediate footprint – and reward, as they position to capture the first wave of hyperscale outsourcing in CEE.

Regional Real Estate Developers and Investors

A second cohort driving CEE data center growth are **regional property developers and investment firms**, some of which are newcomers to the sector. These companies, often with backgrounds in office, industrial, or retail development, have identified data centers as a high-growth asset class and are leveraging their local know-how in real estate to deliver technical infrastructure projects.

One prominent example is **Portland Trust**, originally known for office parks in Prague and Bucharest. Sensing rising demand for digital infrastructure, Portland launched a data center division and secured multiple sites (three in Bucharest, one in Prague)[39]. The firm obtained permits in record time: by 2023 it had a 30 MW IT load project fully approved in Bucharest, and another 30 MW permitted in 2024[53]. Portland's advantage is its long-standing local presence and **joint venture with Ares Management** (global asset manager), which provides capital. The strategy is to *develop, lease, and possibly flip* these assets: they are open to hyperscaler tenants or even selling the finished facilities to an operator. Essentially, Portland Trust is acting as a **merchant developer** in the data center space – using speculative construction on prime land with the expectation of attracting big tenants or buyers upon completion[54][55]. This is analogous to how office developers operate (build and then lease-up), marking an interesting cross-over of business models.

Similarly, in Poland, established industrial developers like **Hillwood, Panattoni, and 7R** have started exploring data center projects. Hillwood's massive Reguły campus plan is a prime case: as one of Poland's largest logistics park owners, Hillwood identified a site with surplus power and decided to pursue a data center park, indicating a **land use pivot** driven by higher returns in the tech sector. While Hillwood's core business is warehouses, it created a dedicated project ("DC Reguły") and engaged with the community and authorities, showing a willingness to navigate unfamiliar

territory[56][57]. If successful, this could pave the way for other logistic developers to monetize land through data center redevelopment, especially for plots less ideal for retail or residential but well-suited for server farms (e.g. near substations or fiber nodes).

Another regional player, **Beyond.pl** in Poland, straddles the line between local and regional. It operates a campus in Poznań and has **land for up to 150 MW** of expansion[58]. Beyond.pl's strategy has been to position Poznań as a second-tier location with excellent connectivity (between Warsaw and Berlin) and renewable energy access. They are gradually building out capacity and courting both domestic and international clients, effectively acting as a regional hub for West Poland. This demonstrates a **cluster development approach**: focus on one city/campus and achieve economies of scale there, rather than spread thin across multiple cities.

Telecom-affiliated infrastructure firms also play a role regionally. Czechia's **CRA** (mentioned above) and **Slovak Telekom's DataCube** facility (the largest in Slovakia at ~10 MW[59][60]) are examples where existing telecom operators leverage their sites and rights-of-way to enter commercial data centers. These organizations typically have **strategic sites (e.g. central offices) in cities** that can be upgraded to data centers, and they bring deep fiber network integration. Their strategy is often to serve the enterprise/government market first, then scale up if hyperscalers show interest. For instance, DataCube in Bratislava serves as a carrier-neutral hub for international traffic, benefiting from Slovak Telekom's network and the city's proximity to Vienna[4][59]. Now, with Digital Realty's land purchase nearby, it's conceivable a partnership or sale could occur, blending the global-regional strengths.

Finally, **regional private equity and infrastructure funds** are making platform bets. Beyond direct real estate plays, we see deals like **Macquarie Asset Management investing in Polish data center ventures**[61], and Singapore's GIC partnering on multi-country platforms (the €1.4 B deal with Vantage's EMEA platform covers Poland among other locations[2]). These investors typically seek regional scale – meaning they'll back a developer that can replicate projects in **multiple CEE countries**. The implication is that a regional player who proves a concept in one country can attract institutional capital to expand elsewhere in CEE, creating a virtuous cycle of growth. For instance, if Portland Trust's first Bucharest facility is a success, Ares and co. could finance expansions in Prague or other CEE capitals, effectively forming a **regional data center portfolio**.

In summary, regional developers bring **local expertise, agility in permitting, and relationships with governments**, which are invaluable in markets where global firms might struggle initially. They are willing to take on speculative risk (building ahead of full occupancy) in exchange for potentially outsized gains if demand materializes. As CEE matures, some of these regional players may well be acquired by larger operators or evolve into pan-European providers themselves.

Local and National Data Center Operators

The third group comprises the **homegrown CEE data center companies and telecom operators**, many of which have operated for years at a smaller scale and are now expanding alongside market growth. These include companies like **Atman and Beyond.pl in Poland, Szervernet in Hungary (though HU is outside our scope, it's similar), NXDATA and ClusterPower in Romania, DEAC in the Baltics, and various telco data center units** (O2 Czech Republic, Orange Poland, etc.).

Their strategies are often rooted in their legacy strengths and domestic customer base. For example, **Atman** (Poland) has long been the national market leader in colocation by capacity. It owns two big campuses in Warsaw and recently opened a third site (Atman WAW-3) with 14 MW initial and expansion up to 43 MW[62][63]. Atman secured a syndicated bank loan in 2022 to finance this expansion[64], indicating local banks' growing comfort with data center projects. Atman's strategy emphasizes reliability and local trust – they attract Polish enterprises and government clients, and now, with larger capacity, they aim to capture cloud providers' nodes as well. Atman also reportedly acquired additional land around Warsaw for future growth[65][66]. The key takeaway is local operators are **scaling up their flagship campuses** rather than diversifying geographically, consolidating their competitive position domestically.

In Romania, **NXDATA** runs the principal carrier-neutral interconnection hubs in Bucharest, and has kept to an *urban, connectivity-focused strategy*. They operate out of a couple of downtown facilities (each a few MW) that host all major ISPs and IXs[67][68]. NXDATA's plan is likely to remain niche – providing vital interconnection services – while larger scale deployments (cloud, wholesale) may occur at new out-of-town campuses like ClusterPower's.

ClusterPower, being a local startup but of unprecedented scale for Romania, has a unique strategy: build a *massive technology park from scratch* in a low-cost region (Craiova) and offer cloud and HPC services on-site. By integrating a private 200 MW gas power plant, they control their energy supply[19]. This vertically integrated model (power + data center) is more reminiscent of some US hyperscale self-builds than a typical colo provider. It was enabled by substantial state aid (~€18 million) and EU funds[69], as well as visionary founders. If successful, ClusterPower could anchor an *entire new data center cluster* in southern Romania. Notably, its presence has already been cited as a model for others – the Romanian government highlights it as an example in pitching the country's capability[70].

In the Baltics, local players (often with pan-Baltic reach) like **DEAC** (Latvia) and **Telia Lietuva** (Lithuania's incumbent telco) are expanding facilities in Riga and Vilnius respectively[71][72]. Their strategy is to cater to Baltic-region needs and connect into Finland/Sweden. For instance, Telia is building Lithuania's largest data center (estimated 3–5 MW) to meet growing demand for cloud and IT outsourcing[71]. The **Baltic States** collectively market themselves as a mini-hub with excellent connectivity to Nordics and relatively cool climate (for free cooling), albeit each market is small. Local operators thus focus on **cross-border offerings** (DEAC merged with DLC in Estonia to pool resources[72]) and emphasize sovereignty/security for Baltic customers.

In smaller CEE markets like **Slovakia and Croatia**, domestic operators exist mostly to serve government and enterprise needs. Slovak Telekom's data centers and smaller IT service firms handle most domestic demand, and as noted earlier, no global colo has set up there yet[73]. These local players are cautious – adding a few MW at a time. For example, **Lightspeed** (a local provider) might add an edge facility in Košice or Zilina if needed, but nothing on the hyperscale level without external investment. **Croatia's** scene is similar: apart from Altus (now Digital Realty) and A1 Telekom's new Tier III site[74], other data centers are run by local telcos or ISPs primarily for their own services. One interesting development in Croatia was A1 building a quake-resilient data center after a 2020 earthquake – showing local contextual needs (Zagreb sits on a fault line) being addressed by domestic initiatives[74][75].

To remain competitive, local operators are increasingly **forming alliances or seeking external capital**. For instance, Atman's owners reportedly explored selling a stake to a global fund to finance growth (market rumors as of 2025). In the Baltics, DEAC's merger and the involvement of foreign investors (Delsk, a Chinese firm) signal consolidation and capital infusion[72]. We can expect more **M&A activity** where global/regional players acquire successful local data centers to immediately gain market share – much as Digital Realty did in Zagreb and Equinix did in Warsaw.

In summary, local CEE data center operators are **growing out of their enterprise-focused roots** and participating in the boom, but most lack the balance sheet to build 50+ MW campuses on pure speculation. They typically expand *in step with demand*, ensuring high utilization. Their intimate local relationships (with government, banks, enterprises) are a strength, and many are leveraging that to partner with larger players for the next growth phase. As hyperscalers deploy, some local firms will become **acquisition targets**, while others will find niches (such as edge data centers, interconnection hubs, or highly secure government clouds) to coexist alongside the big international platforms.

Investment Models and Partnership Structures

The landscape of investment in CEE data center real estate is evolving rapidly, moving beyond traditional owner-operator models to more complex structures that spread risk and capitalize on different expertise. Here we examine the prevalent **investment models**: owning vs. leasing, speculative development vs. pre-let projects, and the rise of joint ventures and platform investments.

Ownership vs. Lease: Emerging Leaseback and Colocation Models

Historically, enterprise and telecom data centers in CEE were **owner-occupied** – built and owned by the company using them (e.g. a bank or a telco). However, the influx of third-party operators and new investors has introduced a **lease-based paradigm** more akin to mature markets.

Cloud giants and large enterprises now commonly lease from colocation providers instead of building themselves, unless the scale justifies a dedicated build. For example, Microsoft and Google chose to lease wholesale space from local partners for their initial Poland cloud regions (in facilities provided by Data4, 3S/Netia, and others) rather than owning the real estate, to accelerate time-to-market[46][76]. This mirrors the Western trend where hyperscalers often prefer leasing from specialist REITs and dedicating capital to their core business.

On the flip side, certain strategic or sensitive projects still opt for **ownership**. Government data centers, for instance, are usually state-owned or in state-controlled facilities for security reasons. In CEE, several governments (Poland, Romania, etc.) are building their own **national data centers** with EU funding[16]. These will be owned by the state and operated either internally or via contract. Similarly, companies with very specific requirements (e.g. nuclear research centers, defense) might build-and-own due to regulatory needs.

A middle ground is the **sale-leaseback model**, which is emerging in cases like telecoms divesting data center assets. A telco might sell its data center to a specialist investor and lease it back to free up capital. There haven't been many high-profile sale-leasebacks yet in CEE (partly because not many telcos had large facilities to monetize), but it's a potential trend as valuations rise. One instance internationally was in 2022 when Telefonica sold data centers in Spain; a similar logic could apply if, say, Orange Poland or O2 Czech decided to monetize theirs. So far, though, these telcos have kept their smaller data centers in-house, often folding them into their cloud services divisions.

For new developments, **lease-based colocation is the dominant model** being pursued. The likes of Vantage, Equinix, Data4, and Beyond.pl all operate multi-tenant facilities where dozens of customers lease racks or entire halls. Even Build-to-Suit arrangements for hyperscalers usually result in a lease – e.g. the facility is designed for a cloud client, but owned by the developer and leased on a long-term contract (10–15 years). This gives the client flexibility and off-balance-sheet benefits, while the developer/landlord secures a stable income stream.

Notably, **lease rates in CEE** are generally lower than in FLAP-D markets (due to lower land and labor costs), but they are rising with demand. A stabilized wholesale lease in Warsaw is roughly in the range of **€150–€170 per kW/month** (depending on power tier and term), whereas Frankfurt or London can exceed €200/kW/month for comparable offerings (estimates, as many deals are

private). These economics drive the interest of investors – the yield on cost for a well-leased CEE data center can be very attractive if built efficiently. That said, tenants often negotiate currency considerations (e.g. pegging rent in EUR even if costs are in PLN or CZK) to avoid FX risk, especially in non-euro countries.

In sum, **the trend is toward third-party ownership** of new capacity, with users leasing space – a significant shift from a decade ago. This is enabling faster growth: companies no longer need to foot the entire capex for their data needs, they can lease as needed. For developers, it means that securing tenants (or at least interest) is key to financing – which brings us to the approach of speculative vs. pre-leased builds.

Speculative Development vs. Hyperscaler-Led Projects

CEE is seeing a mix of **speculative developments** (building capacity in anticipation of demand) and **hyperscaler-led projects** (building only when a major customer commitment is in hand). The balance between these approaches is a fine one, often determined by access to capital and confidence in market absorption.

In markets like Warsaw, developers have shown **increased risk appetite** to build ahead of full pre-leasing – essentially speculative builds. Vantage's first Warsaw campus started without announcing any signed customers (though they likely had soft commitments)[47]. Data4 similarly began site works in Poland on spec. These moves indicate strong belief that "if we build in Warsaw, the clients will come," given Poland's growth trajectory. The rationale is that **speed to market is a competitive advantage** – having ready-to-use capacity can sway a hyperscaler's decision to deploy with you versus a competitor. For instance, if AWS decided tomorrow to roll out an Availability Zone in Poland, the provider with an available hall and expansion shell could accommodate them faster and would likely win the deal.

That said, fully speculative mega-projects are still relatively rare in CEE due to financing constraints. Lenders and investors typically want to see some **anchor tenant or off-take agreement** before committing tens of millions. Therefore, a common strategy is the **anchor-led phase 1**: secure one large customer (e.g. a hyperscaler or large cloud service) for the first phase, which then justifies building the supporting infrastructure that can later serve additional phases speculatively. The Greykite/EdgeConneX "Digital Ursus" project is a good example – it reportedly secured **a leading global operator as anchor tenant on a long-term lease** (presumably EdgeConneX itself or possibly their end-customer) which de-risked the project financially[77][3]. Subsequent phases beyond that tenant's needs can then be offered to others.

Hyperscaler-led builds are somewhat limited so far in CEE, but one clear case was Microsoft's ill-fated Prague plan. Microsoft was effectively acting as its own developer, intending to build to suit its Azure region. After that fell through[11], Microsoft (and peers) shifted to an approach of **pledging demand rather than building directly**. For instance, Microsoft ended up working with local partners in Poland instead of owning the DC; similarly, Google Cloud in Poland leveraged third-party sites. We might see hyperscalers directly catalyze new builds by signing **availability agreements** – e.g. an AWS might say "we will occupy 20 MW by X date" which a developer can take to the bank to fund a new build. Those are essentially hyperscaler-led (the project won't happen without their commitment), but the real estate is still owned by the developer.

In some smaller markets (Romania, Baltics), hyperscalers have not yet made direct commitments, so most projects are either speculative or driven by regional demand. **ClusterPower's campus** was largely speculative – they built phase 1 without a guaranteed big customer, betting on demand for HPC and cloud to materialize (helped by some government contracts and enterprise clients to start). It's a high-risk, high-reward play. Thus far, ClusterPower has attracted enough business (including being certified as NVIDIA-ready for AI infrastructure) to validate the concept[78], but the full 200 MW will likely take years to fill.

Speculative building is also moderated by power availability: a developer might want to build on spec, but if the grid can't deliver power until 2 years later, they have to time construction accordingly. This makes some "speculation" less speculative in practice – you build in sync with when infrastructure is ready and hopefully align that with when customers want space. We have seen developers in CEE securing grid connections first (queue positions) and then marketing capacity to hyperscalers using those future-ready power slots as a selling point[27]. In effect, they speculate on power (a scarce resource) more than on immediate customer contracts.

In summary, CEE is transitioning from a purely **demand-driven build model** to a more **supply-driven model** in the top markets. Speculative development is increasing as confidence grows, but most big projects still secure at least one major tenant or funding partner to share risk. As the market matures (like FLAP already has), we can expect speculation to become even more common – leading to potential oversupply cycles if not carefully managed. At the moment, however, demand (especially from cloud/AI workloads) appears to be outpacing supply, justifying the aggressive development pipelines.

Joint Ventures, Fund Platforms, and Hybrid Financing

To fuel these developments, innovative **joint venture (JV) structures and investment platforms** are proliferating in CEE. These partnerships blend the strengths of different types of players: capital providers (private equity, sovereign wealth, infra funds), real estate developers, and technical operators. The goal is to **share the high capital costs and risks** of data center construction while positioning to capture the robust returns.

One headline example was **Vantage's €2.5 B joint venture** announced in 2024 for its European expansion[2]. That partnership included an infrastructure investor (PSP from Canada) and others providing equity to Vantage in exchange for stake in the portfolio. The funds are earmarked for projects in multiple countries, including Poland, which enabled Vantage to accelerate its Warsaw build and eye new sites. Essentially, rather than each project being financed in isolation, a **platform fund** is created – spreading risk across several data centers and countries.

Another model is **developer–investor JVs** at a project level. For instance, Portland Trust's data center projects are likely co-funded by Ares Management (their JV partner)[79][54]. Ares, as a global investor, provides capital and possibly debt structuring, while Portland provides the local development work. Both share in the eventual upside (through either operating cash flows or an exit sale). This arrangement was crucial because data centers require large upfront outlays for power and cooling infrastructure, which a local developer might not finance alone. By bringing in Ares, Portland could undertake multiple projects simultaneously.

We also see **technology-company to real estate JVs** emerging, as illustrated by **Boosteroid (cloud gaming firm) partnering with DL Invest Group (Polish real estate)**[80][3]. Boosteroid brings a guaranteed demand (it will use the facilities for its cloud gaming servers) and possibly some hardware investment, while DL Invest contributes its development experience and capital for construction. Their JV plans a network of data centers (20–40 MW initial sites) which they can both benefit from – Boosteroid gets custom-tailored infrastructure and DL gets a long-term tenant and entry into a new asset class. This kind of **vertical partnership** (tenant with developer) is a win-win: the tenant influences design and secures capacity, and the developer gets a de-risked project with secured income. Given the rise of AI and specialized compute needs, we might see more such alliances (e.g. an AI startup partnering with a campus developer to build an AI-optimized data center).

In financing, **syndicated loans and project finance** are becoming more common for larger builds. Local banks in CEE, which historically financed offices and shopping malls, are now looking at data centers. Atman's expansion in Poland was backed by a syndicate of banks providing long-term loans[64]. Banks perceive well-leased data centers as stable infrastructure-like assets, though they still require higher equity during construction due to the technical risks. Export-credit agencies may also get involved if major equipment (generators, cooling) is sourced from certain countries.

We should also mention the role of **public financing in joint structures**. For Western Ukraine, any data center investment would almost surely involve entities like the **U.S. Development Finance Corporation (DFC)** or World Bank's **MIGA** to provide political risk insurance or loans[23]. These public financiers essentially partner with private investors to enable projects that otherwise might be too risky. While Ukraine's case is unique (due to war risk), it's part of the toolkit for long-horizon opportunities – e.g. a consortium of private developers and international financial institutions might come together by late 2020s to build the first secure data center in Lviv or Ivano-Frankivsk, sharing risk through guarantees.

Finally, **exit strategies** for these partnerships often involve real estate investment trusts (REITs) or large infrastructure funds acquiring the stabilized assets. It would not be surprising to see, by 2026–2030, some CEE data center portfolios either going public as a REIT or being sold to one of the big players (Equinix, Digital Realty, etc.) once they reach a critical mass. In that sense, many JVs are likely building with an eye toward an **eventual sale or IPO**. For instance, if Portland Trust builds 100+ MW across CEE and leases it up, Ares and Portland might choose to sell the entire portfolio to an investor who wants an immediate CEE platform (similar to how American Tower acquired telecom tower portfolios).

In summary, **collaboration is the name of the game** in CEE data center investment. No single entity typically has it all – the local knowledge, the construction capability, the customer relationships, and the deep pockets – so partnerships fill the gaps. This trend mirrors global practices but is especially important in emerging markets to spread risk. As the sector grows, these partnerships may consolidate, but for now they provide the flexible capital and expertise needed to turn ambitious campus plans into reality across Central and Eastern Europe.

Site Selection Criteria for Data Centers in CEE

Choosing the right site is arguably the most critical decision in data center development, as it affects not only construction feasibility but also long-term operational efficiency and attractiveness to clients. In CEE, site selection follows many global best practices but with regional nuances. Key criteria include **power grid access, fiber connectivity, latency to end-users, tax and incentive zones, environmental risk, and the potential for expansion**. Below we break down these factors:

Power Grid Capacity and Energy Availability

Reliable, high-capacity power is the first and foremost requirement for any data center site. Operators in CEE seek locations with access to **substantial electrical infrastructure** – ideally an existing high-voltage substation nearby or the ability to install dedicated transformers. A single large data center campus (say 20–50 MW) can require as much power as a town, so the site must either plug into the transmission network or a very robust distribution network.

In practice, this means many preferred sites are in **industrial zones or near utility corridors**. For example, Warsaw's Bielany district (where Vantage built) is an industrial area with strong grid links, and the Jawczyce area (Data4's site) likewise had a 120 kV line in proximity[29]. In Bucharest, Portland Trust's plot is behind an old factory and likely near existing industrial power lines[38]. Sites near **power plants or major substations** are also coveted – such as areas outside Prague or Budapest where generation plants feed the grid (even if Budapest isn't in scope, the principle holds across the region).

Where grid capacity is constrained (like central Warsaw or Prague), developers look at **on-site power solutions**. On-site generation using gas turbines or diesel gensets isn't new, but ClusterPower took it further by building its own **private power plant** (natural gas-fueled) to supply its campus[19]. This bypasses the weak local grid and even allows selling surplus power. Similarly, some projects are incorporating **large battery energy storage** to manage peak loads or as backup to mitigate grid outages[20]. In Poland, given the queue for new grid connections in Warsaw is 12–24 months long[81], interim solutions like gas generators are considered to bridge the gap for initial phases.

Another power consideration is **energy cost and source**. Countries with cheaper electricity (often due to domestic generation) are attractive. The Czech Republic's industrial power is only ~€0.07/kWh – among Europe's lowest – thanks to nuclear and coal plants[82]. Slovakia too has very low-carbon, nuclear-heavy electricity (around 85% low-carbon)[83], which appeals to companies with ESG goals. These factors can tip the scales when comparing sites across borders. For instance, a data center in Slovakia can boast near-zero carbon operations by default due to grid mix[83], whereas one in a coal-reliant area might have to invest more in renewables or offsets.

Thus, site selectors in CEE evaluate: **Is there sufficient power for initial and future phases? What upgrades are needed and how fast can they be in place? What is the cost per kWh and the energy mix?** In many cases, **grid studies and utility MOUs** are done even before land purchase. Some governments assist: Poland's grid operator PSE earmarked 1,200 MW for data centers through 2034[84][85], which means certain regions will get infrastructure reinforcement (a positive signal for

site planning). Similarly, EU recovery funds in Romania are financing new 400 kV lines and grid automation by 2030[86], improving future power reliability.

In summary, **power is king** – a site without a clear path to tens of megawatts of stable power will not make the shortlist. CEE developers often choose to "follow the power" – picking secondary cities or outskirts where capacity exists, rather than force a project into a power-starved urban location. This dynamic is directly shaping the geography of new data center campuses.

Fiber Connectivity, Network Hubs and Latency Considerations

Right alongside power in importance is **connectivity**. Data centers must be hooked into fiber-optic networks, preferably with **multiple diverse fiber routes** for redundancy. When evaluating a site, developers ask: How many carriers service the area? Is there a nearby Internet Exchange (IX) or long-haul fiber route? Can we get dark fiber from here to major network nodes?

In CEE, the main network hubs are typically in capital cities (Warsaw, Prague, Vienna, Frankfurt) and a few secondary hubs (e.g. Budapest, Bucharest). Sites within **30–50 km of such hubs** are ideal, as fiber backhaul cost is low and latency is minimal. This is why Warsaw's outskirts are still prime – being <20 km from downtown where most fiber interconnects and the cloud on-ramps exist[87]. Similarly, Prague's advantage is being at a crossroads of Central European fiber – connecting into Vienna, Frankfurt, Warsaw routes easily[88].

Latency requirements influence site choice especially for hyperscalers and financial sector clients. For example, Bratislava (Slovakia) is just ~1 ms from Vienna, making it effectively part of the Vienna metro latency footprint[4][5]. This "same latency, lower cost" proposition is explicitly touted – a deployment in Bratislava can serve Vienna users almost as fast as if it were in Vienna, but with cheaper land/power and less congestion. We see similar thinking with **Tallinn serving Helsinki** (via undersea fiber, ~5 ms away) or Bucharest to Istanbul.

Thus, a site must ensure **robust fiber connectivity**: typically two or more independent fiber providers must be available. Many industrial parks in Poland and Czech now advertise fiber readiness. For instance, Orange Polska markets certain properties for data centers, highlighting that they have dual feeds from Orange and another carrier[89][90]. A case in point: an Orange property listing mentions it provides connectivity to both Orange and other operators through its network[90], exactly the kind of selling point needed.

New submarine cables and terrestrial networks are also expanding connectivity in CEE. Croatia anticipates new **Adriatic undersea cables** that will land in Croatia and improve latency to Western Europe[91]. Constanța in Romania has submarine cables like the Black Sea cables which connect to the Caucasus and Turkey[92][93]. A data center near those landing stations (Constanța or Varna) could position itself as a gateway between Europe and Asia/Middle East. However, most current developments stick closer to core routes and population centers.

In summary, a **site with poor fiber is a non-starter**. Most developers involve fiber providers early, sometimes building their own fiber spur to the nearest exchange. Having a **low-latency footprint** – meaning being close enough to serve key markets – is a strategic site attribute. For example, Western Ukraine's potential stems from being close to EU networks; a future Lviv data center could serve Poland and Western CEE with acceptable latency, but only if fiber cross-connects are reinforced at the border (something DFC and others are reportedly considering funding). Likewise,

sites in Eastern Poland or Lithuania might aim to serve Western Ukraine and Belarus customers if political situations evolve, leveraging cross-border fiber.

Special Economic Zones, Tax Incentives, and Cost Factors

Financial and regulatory incentives tied to location also weigh heavily in site selection. Many CEE countries have **Special Economic Zones (SEZs)** or investment incentive programs that offer tax breaks, grants, or simplified permitting for projects in certain areas.

Poland's Special Economic Zones / Polish Investment Zone is a prime example. Poland has effectively turned the entire country into an "investment zone" where qualifying projects (usually above a certain capex or job threshold) can get **CIT (corporate income tax) exemption for 10–15 years** up to a percentage of their investment. The percentage varies by region – less developed regions offer 50% or even 70% tax relief for eligible investments[7]. Data centers have been explicitly highlighted as a priority sector in some zones[6]. Additionally, specific SEZs (like Pomeranian, Katowice, etc.) provide **real estate tax exemptions and help with permits**[10]. For a data center, which is capital-intensive but doesn't create huge numbers of jobs, these tax savings can be very significant in improving ROI. Thus, developers often choose sites **within SEZ boundaries** when possible. For instance, the Pomeranian SEZ reported PLN 2.8 billion ($700M) in new investments in 2024 with tech infrastructure projects "increasingly represented"[94] – likely including data centers around Gdańsk/Gdynia.

In **Romania**, while there isn't an SEZ program per se for data centers, the government's incentives come via the **Recovery and Resilience Facility (RRF)** and state aid schemes. The RRF (part of EU post-Covid funds) allocates 21% of Romania's €29B plan to digital transition[15], which includes building government data centers and improving broadband. This doesn't directly give a tax break to a private investor, but it means public funding might co-invest in digital parks or cover some infrastructure (e.g., fiber networks, training workforce). Romania also touts **generous state aid** for large investments – for instance, up to 50% of project value in grants for creating new jobs or for R&D facilities[95]. A large data center could potentially negotiate a custom aid package, especially if in an economically weaker region.

The **Baltic states** use general investment incentives and EU funds to attract data centers. Lithuania, for example, has had success attracting Google to build a large global cache facility by emphasizing low taxes and fast permits (Google built a smaller DC in 2019 there). The Baltics also highlight their **100% renewable energy options and cool climate** as natural incentives – essentially marketing *environmental incentives* (no cooling tax like in some countries, abundant free cooling, etc.).

Cost of land and labor are also part of the site equation. A location in a capital city may have superb connectivity but high land prices and wages, whereas a secondary city might be cheaper but require more buildout of network. For instance, land on Warsaw's outskirts might cost, say, €100/m² (hypothetically), whereas in a town 100 km away it could be €20/m² – but then one must weigh the added network and personnel costs. The Orange Polska guidance suggests **2–5 ha plots** are typical for a new data center[9]; at that size, a €80/m² difference in land cost translates to millions of euros difference. Many projects therefore pursue a **"edge of city" strategy**: close enough to a city for connectivity and workforce, but far enough to get affordable land and fewer

zoning issues. Reguły near Warsaw or Zbraslav near Prague are good examples – just outside city limits.

Labor availability can be regionally important too. A data center needs skilled technicians, electricians, security staff; while not huge in number (maybe 20–50 staff for a large site), a remote rural site might have trouble staffing. Therefore, being near a university town or a city with IT workforce is a plus. Cities like **Cluj (RO), Brno (CZ), Kraków (PL)** could be attractive on that front – they have tech talent pools (though connectivity needs to be ensured).

In summary, **incentive packages and cost structure** are often what differentiate two otherwise viable sites. If Country A offers a decade of tax-free operations and Country B doesn't, a developer's pro forma might favor Country A's location strongly. We've seen countries compete on this: e.g., **Ireland's and the Netherlands' incentive lapses (due to moratoriums or public pushback) indirectly benefited CEE as an alternative**[96][97]. Within CEE, Poland's robust incentives make it very attractive financially[6], whereas a country like Czechia, while having low power costs, has fewer tax breaks specifically for data centers (though they offer general investment credits and are improving processes)[98].

Environmental and Geographical Factors

While power and network are paramount, **physical and environmental factors** also play a role in site selection. These include climate, natural disaster risk, and soil/terrain considerations.

Climate: Cooler climates are beneficial for data center cooling efficiency. The Baltics and Poland have a moderate to cold climate for much of the year, allowing extensive **free cooling** (using outside air instead of running chillers). This can reduce energy consumption and thus operating cost. It's a subtle advantage CEE has over, say, Southern Europe. For example, an average annual PUE (Power Usage Effectiveness) might be slightly lower in Tallinn or Warsaw than in Madrid purely due to climate. That said, most modern designs can handle various climates, and if power is cheap it offsets some cooling costs.

Geologic risks: Earthquake risk is generally low in most of CEE except parts of the Balkans (Slovenia, Croatia, Romania). As noted, **Zagreb had a significant quake (M5.5 in 2020)** that spurred building to higher seismic standards[74]. Any data center in a seismically active area must be engineered for it (like A1's new DC in Zagreb built to withstand magnitude 9.0[74]). Romania has moderate seismic zones (especially in the Vrancea region affecting Bucharest) – datacenters there incorporate anti-seismic design as needed. Site selectors may prefer geologically stable areas; for instance, choosing a site on solid bedrock vs. reclaimed land can be a factor (especially for very heavy facilities or tall multi-story data centers).

Floodplains and water: Avoiding flood-prone areas is crucial. Locations near major rivers (e.g. Danube, Vistula) are scrutinized. The Orange site selection tips explicitly mention not locating near facilities that pose flood or fire risk[99][100]. A notable Western case was Google's data center in Dublin being rejected partly over floodplain concerns. CEE developers likewise use flood maps to steer clear. For example, Warsaw's new DC clusters are mostly on higher ground west or south of the city, not along the Vistula's floodplain.

Soil and terrain: The geotechnical properties of a site matter for construction cost. Hard, stable soil is preferable to marsh or land requiring piling. In Poland, areas around Warsaw often have decent

soil, but some places might have high water table requiring expensive foundation work. Site due diligence includes borehole tests – checking bearing capacity, groundwater level, etc.[101][102]. The Orange Polska guidelines recommend geotechnical studies to assess risk of foundation issues[101]. A plot that fails such tests might be passed over due to higher construction complexity or risk.

Availability of water for cooling (if using water-cooled chillers) can sometimes be a factor – e.g., being near a body of water or a municipal supply with sufficient capacity. However, with the trend toward air-cooling and waterless cooling (and concerns about water usage), this is less of a site driver than it used to be. Some new designs avoid water entirely (which is good in regions that face droughts or have expensive water).

Proximity to hazards: Data centers avoid being too close to chemical plants, airports (flight path crash risk), and other hazards. In CEE, heavy industry zones might have pollution or risk of accidents, so a balance is needed – industrial power infrastructure is good, but not next to an oil refinery for instance. Poland has some sites in former industrial areas (like the Ursus site, which was an old tractor factory area – now redeveloped for tech use[50]). Those can be fine as long as remediation is done for any soil contamination.

Overall, these environmental factors are typically about risk avoidance and cost optimization. Many of CEE's prime sites luckily have low natural disaster risk and temperate climates. An extreme weather consideration that is emerging is **heatwaves** – as climate changes, the region has seen occasional heat records. But still, CEE's northern parts remain cooler than the south of Europe. For instance, a heatwave might push Budapest to 38°C, while Stockholm is 25°C; Warsaw would be around low 30s in a similar event – still manageable for cooling.

In conclusion, *the ideal CEE data center site* is one that **blends strong power and connectivity with low risk and supportive policies**. It would have ample grid capacity (or on-site generation plans), multiple fiber paths (with one leading to a major IX), low tax/high incentive status, no show-stopping environmental risks, and room to expand. Not every site will check every box, so developers prioritize based on project needs – e.g., a latency-critical edge site might sacrifice some tax incentive to be right in the city, whereas a big wholesale campus might go where power and land are cheapest even if a bit farther out. This calculus is at the heart of strategic site selection in the CEE region.

Regulatory and Permitting Challenges by Country

Regulatory environments in CEE can either facilitate or hinder data center projects. Issues range from **permit approval times, bureaucracy levels, grid connection regulations, to environmental clearance processes**. Here we provide a country-by-country snapshot of key regulatory and permitting challenges and recent developments:

Poland: Pro-Investment Climate with Streamlined Permitting

Poland is generally regarded as having a **business-friendly regulatory framework** for data center development. The government at national and local levels has been supportive, seeing data centers as strategic investments. Key points:

- **Construction Permits:** Obtaining a building permit in Poland is relatively straightforward in areas zoned for industrial/technology use. There is no national moratorium or special restriction on data centers. Local authorities often welcome such projects for their economic benefit. For example, near Ożarów (West of Warsaw), Atman quickly got approvals for its new campus in a designated industrial suburb[103]. Challenges can arise if the site needs rezoning or if locals object (as in Reguły, where residents are petitioning and appealing permitting decisions)[21][104]. However, those are local disputes rather than systemic bureaucratic issues.

- **Special Economic Zones:** Within SEZs or the Polish Investment Zone program, permits can be **expedited** by dedicated support teams. SEZ authorities often act as facilitators between investors and local government, smoothing the process[10]. This has helped reduce red tape for qualifying projects.

- **Environmental Permits:** Data centers must comply with standard environmental impact assessment (EIA) rules, but they typically have manageable impacts (main concerns: noise from generators/cooling, diesel storage, etc.). In Poland, EIA can often be done as part of the building permit process for industrial sites. In the Kajetany case, locals were upset that authorities initially waived a detailed environmental study[105] – implying that under Polish law a data center might not be considered to have significant environmental impact requiring a full EIA, if it meets certain criteria. Nonetheless, to avoid challenges, many developers do voluntarily address environmental aspects (noise abatement walls, etc., to appease concerns).

- **Grid Connection Approvals:** The major hurdle in Poland is actually on the **power connection side**. PSE (the transmission operator) and local utilities have queue systems. It can take 1–2 years to get a connection agreement in regions like Warsaw[81]. Poland has been investing to improve this (11,000 km of new lines planned by 2034[106]), and recently updated grid codes to allow faster connection of large customers in some cases. Still, developers have to navigate technical permitting with utilities (which is separate from building permitting).

Overall, Poland's regulatory regime is **favorable and one of the most efficient in CEE**. The government actively pitches Poland as having "Europe's most favourable" conditions[107], citing the Investment Zone incentives and improving infrastructure as proof. As a result, Poland has not (so far) seen major projects stalled by red tape – a stark contrast to some neighbors.

Czech Republic: From Bureaucratic Headwinds to Reforms

The Czech Republic has a reputation for **bureaucratic complexity** that has slowed data center investments, though steps are being taken to improve the situation:

- **Permitting Delays:** The Microsoft experience in Prague became almost a cautionary tale. Microsoft reportedly faced **"complex bureaucracy and long wait times"** for various permits (construction, utilities) and ultimately cancelled its project in 2023[11]. They had spent ~$64 million on land and preliminary work[108], demonstrating how costly delays can be. The root issues included navigating Prague's zoning rules, lengthy EIA procedures (in an urban context), and difficulty in coordinating utility approvals.

- **Utility Connections:** As mentioned, getting a large power connection around Prague can take **3–5 years**[13]. This is partly due to needing to build new substations or upgrade lines, which itself requires permits and community approvals. CEZ, the local utility, has been slow to greenlight big loads because the grid was near capacity in some parts.

- **Government Response:** Aware of these problems, Czech authorities have made some regulatory changes. In 2023–24, an amendment to the investment incentives law and construction law was passed to streamline approvals for strategic investments (which can include data centers). CzechInvest, the investment promotion agency, now has more ability to shepherd projects. For example, they reported **28 investment projects (all sectors) facilitated in 2024** after process improvements[109]. Only two were tech center classified (which likely includes data centers)[110], showing it's still new for them. The government is keen not to lose more hyperscale opportunities, so further simplifications (like one-stop-shop permitting for large tech projects) are being discussed.

- **Data Governance/Policy:** Another subtle issue was data residency policies – earlier, Czech laws around some public data made foreign cloud investment tricky (though EU-wide regulations are harmonizing this). This is less about permitting and more about political climate. With EU's upcoming cloud certification and with government digitization needs, Czech political will to accommodate data centers has grown.

The outlook is cautiously optimistic: **CRA's 26 MW Prague project proceeding** suggests that if one navigates carefully (and maybe has local backing), it's possible to get things done[33]. The hope is that if CRA's project succeeds by 2025, it will serve as proof that barriers can be overcome, possibly enticing Microsoft or others to revisit Czechia[111][112]. In summary, Czechia's regulatory environment has been a bottleneck, but pressure to change it is yielding improvements. Still, relative to Poland or Lithuania, expect longer lead times in Czech – one needs a lot of *patience and local knowledge* to push a large project through.

Romania: Improving Framework with Public Sector Push

Romania historically wasn't a focal point for data center investment, and its bureaucracy can be slow, but recently there is strong government impetus to modernize:

- **Permit Processes:** Building permits in Romania can involve multiple layers (local council, utilities, environmental, etc.). However, the Romanian government's digitization drive (as part of RRF) explicitly calls for **fast-tracking permitting to under 90 days for greenfield**

sites[113]. It's an aspirational target, but some regions are indeed trying "fast-track" lanes for IT infrastructure projects. For example, reports indicate that Portland Trust got its Bucharest permit in about a year or less, which is decent by local standards[114][115].

- **Zoning:** One challenge can be outdated urban plans. If a site is not already zoned industrial/IT, rezoning can take time. The Portland Trust site was in an industrial zone, which helped. They also demolished old structures (which requires separate approval to clear heritage issues if any – apparently not an issue there)[40]. A positive is that Bucharest and other cities have many brownfields that local authorities are eager to see redeveloped, so they may cooperate on zoning adjustments.

- **Grid and Power Approvals:** Romania's grid company Transelectrica requires permits for high-power connections. In clusterPower's case, being outside Craiova, they had to align with national energy regulators for their gas plant and grid sync – which they managed, partly by obtaining **government recognition as a strategic project** (hence the state aid support)[69]. The government is also investing in grid upgrades (new lines, etc.) by leveraging EU funds[86], aiming to make more regions viable. Still, outside a few metro areas, developers might face power extension costs/time.

- **Use of EU Funds:** Because Romania ties a lot of its digital strategy to EU money, any project that aligns with that (e.g. a data center that can claim to improve government cloud or regional development) might get **faster administrative handling** or co-funding. For instance, a plan to build regional public data centers is in motion[16]; a private investor partnering on such an initiative could benefit from that streamlined pipeline.

- **Corruption/Transparency:** Romania has historically had issues with corruption in construction permitting. The government is under EU scrutiny to improve transparency. Data center investors typically engage top law firms and ensure compliance to avoid any hiccups – which might mean more upfront effort, but it's manageable. Interestingly, S&P Global noted Romania's **low corporate tax (effective ~14.7%)** and incentives make it appealing, but also flagged that political instability and corruption are concerns for some investors[116][117]. Addressing those is part of the ongoing reforms tied to the EU funds.

In conclusion, Romania's regulatory environment is **trending positive**, with the government essentially saying "we want data centers, tell us what you need." Still, local realities (like building a stable power link in rural areas, or dealing with municipal bureaucracy) can cause delays. The key for investors is to align with government initiatives (like RRF projects) to gain priority status.

Baltics: Small Markets with Generally Efficient Permitting

The Baltic states (Estonia, Latvia, Lithuania) are known for relatively efficient governance (especially Estonia). While each has its specifics, some general points:

- **Fast Permits:** Estonia in particular has a digital-first government, where many permitting steps are online. The Greenergy Data Center in Tallinn was built and operational by 2022, suggesting a permit timeline of only a couple of years from conception[17][118]. The Baltics also have fewer big developments, so bureaucracies are not overloaded – a data center project might get more attention simply because it's significant for them.

- **EU Membership and Eurozone:** Being in the eurozone (all three Baltics and also Slovakia, Slovenia, etc.) removes currency issues and means regulatory standards are closely aligned with EU norms, which investors find reassuring.

- **Specific issues:** One challenge could be that local utilities are smaller. In Latvia, for example, connecting a 30 MW data center (like the new DEAC facility) may be one of the largest connections they've done, which could entail some first-of-a-kind delays. But governments are supportive; Latvia's investment agency sees data centers as part of its ICT sector growth.

- **Lithuania** had a high-profile Google land purchase in 2020 (for a potential data center near the Kruonis hydro plant), which got government backing. Lithuania's permitting did not impede Google – in fact the project was put on hold by Google for internal reasons, not local bureaucracy. So one could infer Lithuania would quickly greenlight major DC projects.

- **Latvia** has been promoting itself in partnership with Finnish and Swedish networks. When DEAC/Delsk announced the up-to-30 MW campus in Riga, the government likely was involved in facilitating it (especially as it ties into an economic strategy to be a regional digital hub).

In summary, **Baltic regulators are generally accommodating** and relatively quick, given the smaller scale and the political will to attract tech investment. One potential drawback is market size – a large hyperscaler might skip Baltics in favor of a bigger market unless there's a specific reason (like serving Russian/transit traffic, which now is diminished due to geopolitical issues). But as far as permitting goes, they are not known for red tape in this sector.

Slovakia and Croatia: Stable but Needing Clear Frameworks

Both Slovakia and Croatia are EU members that have only nascent data center markets, so their regulatory frameworks are not heavily tested by large projects yet:

- **Slovakia:** The government signaled interest in attracting a hyperscale region by leveraging EU funds and energy surplus[119], but there haven't been major projects to test permit processes. Generally, Slovakia ranks well in ease of doing business. Construction permits take some months but not extreme delays. The likely challenge would be if a huge project needed new grid infrastructure – but as noted, Slovakia has good power capacity. If Digital Realty proceeds near Bratislava, expect the government to smooth the way to not lose that investment. Also, Slovakia's adoption of Euro and solid rule of law (one of highest in CEE)[120][121] means fewer administrative uncertainties (contracts are enforced, etc.).

- **Croatia:** One issue flagged has been **grid connection fees and renewable approvals** delays[14]. The energy regulator and utility in Croatia have been slow to approve new generation and connections, causing backlog. A data center needing significant power might face delays if it coincides with these issues. However, Croatia's entry into the eurozone (2023) and stable government now give it a better investment profile. The Digital Realty acquisition of Altus IT shows that foreign investors can navigate Croatian regulation successfully (they got all approvals to transfer ownership and continue operations under a

new international entity). The government also encourages ICT investments as part of EU integration for the Balkans.

- **Potential hurdles in Croatia**: Aside from grid, perhaps more bureaucracy around land ownership (Croatia has some complex land registry processes historically). But a data center in a business park (like A1's) didn't encounter known issues publicly.

In both countries, because the data center sector is small, there might not be a streamlined "data center-specific" process – projects would go through general permitting channels. This can be fine if local officials are cooperative, but if not prioritized, could be slow. However, given the high-profile nature of such investments, governments usually do step in to facilitate.

Western Ukraine: Although not a country in EU or currently stable, it's worth noting regulatory aspects. Ukraine pre-war had improved business processes somewhat (e.g., construction permitting times were cut to under a year in many cases). If stability returns, Western Ukraine might offer incentives like **tax holidays, cheap land** and government guarantees to attract pioneers. Already, frameworks like **MIGA political risk insurance** are being discussed[23]. Ukrainian law might also allow public-private partnerships, and donors would push for transparent processes. So, the regulatory environment will likely be tailored (with international oversight) to encourage investment when the time is right.

In summary, **Slovakia and Croatia present no major unique regulatory barriers** beyond general European norms, but they also lack the proactive facilitation seen in Poland or Baltic states. They will likely adapt quickly once a serious project comes – indeed, as soon as Digital Realty or a hyperscaler knocks, one can expect VIP treatment to make sure the investment doesn't slip away.

Across CEE, a common theme is emerging: **governments recognizing the economic importance of data centers and gradually adjusting regulations to be more inviting**. Poland leads in this regard with concrete incentives and an efficient track, Czechia is learning from a setback and improving, Romania is leveraging EU frameworks, and others are generally positive if not particularly experienced yet. The critical improvements needed mostly revolve around **speeding up electrical grid upgrades and simplifying multi-agency coordination**. Where those have been addressed (or circumvented via private solutions), projects are moving forward. Where they haven't, delays persist but are gradually being tackled as the region competes to capture the next wave of digital infrastructure investment.

Incentives and Public-Private Support Frameworks

To catalyze data center investments, CEE countries have rolled out various **incentive schemes and collaborative frameworks**. These range from tax breaks and grants to strategic partnerships between government and industry. Such support can significantly tilt the economics in favor of a particular location. Here we detail key programs and initiatives:

Special Economic Zones and Tax Relief Programs

Special Economic Zones (SEZs) have been a cornerstone of investment incentives in several CEE countries, particularly Poland. These zones (now merged under the **Polish Investment Zone** program) offer generous fiscal incentives:

- **Poland:** Companies investing in designated areas or meeting certain criteria can receive **corporate income tax (CIT) exemption** on profits generated by the investment for a period, effectively reimbursing a portion of their capital spend. The level of relief depends on region (higher in less developed eastern Poland) and company size – up to **50% of eligible costs for large firms, and 70% for SMEs**[7]. Data centers qualify as strategic investments in many cases. Moreover, Poland provides additional tax incentives such as **200% super-deductions for R&D expenses on energy-efficient equipment** and **50% "robotization" tax relief** for automation investments, which data centers can utilize (since modern facilities involve automation in operations)[122]. Taken together, these can substantially cut the effective cost of a project. For example, an international operator building a €200M campus in an SEZ might effectively get €100M of that exempted from future taxes, improving their ROI.

- **Real Estate Tax and Local Support:** Many Polish SEZs also waive **property taxes** for a number of years[10], which is notable because data centers are high-value properties that otherwise incur significant annual property tax. Local municipalities often partner with SEZ authorities to ensure infrastructure (roads, water, sewage) is provided to the site. Essentially, a data center investor in an SEZ enters a supportive ecosystem with a one-stop contact point to navigate permits and get support services.

- **Other Countries:** While Poland's program is among the most institutionalized, other countries have analogous offerings:

- **Czech Republic** provides investment incentives through CzechInvest, including **income tax relief for up to 10 years**, cash grants for job creation, and training support for tech investments[98]. However, these are usually applied to manufacturing or R&D centers; extending them to data centers is possible (especially if classified under "technology centers"), but Czechia historically hasn't specifically tailored incentives for data centers.
- **Slovakia** and **Croatia** also offer tax credits and cash grants for capital investments above certain thresholds. Croatia, for instance, under its Investment Promotion Act, offers **tax reductions tiered by investment size and region**, and potentially land cost reduction if in a technology park. Slovakia similarly can offer **tax relief and cash grants** especially in eastern regions. For a data center, the challenge might be meeting job creation thresholds (which are often part of incentive criteria) since DCs don't employ masses. However, governments

are learning to be flexible on that, given the broader economic impact (construction jobs, ancillary services).

- **Baltic States** typically have lower corporate tax rates by default (Estonia famously defers all corporate tax until distribution of profits), so their incentive focus is on things like no tax on reinvested earnings (useful for a data center that reinvests in expansion) and support with land or training. The Baltics also leverage EU structural funds to co-finance infrastructure around project sites.

In effect, these incentives act as a **magnet for data center projects**, often making a huge difference in total cost of ownership analyses. They are a key reason, for example, that many international firms choose Poland as their CEE base – the **net present value of tax savings** can run into tens of millions on a large deployment[107].

EU Funding and Public Grants for Digital Infrastructure

Beyond tax breaks, **European Union funds and national public grants** play a vital role in supporting data center-related development in CEE. Some notable frameworks:

- **Recovery and Resilience Facility (RRF):** As mentioned, countries like Romania have earmarked significant portions of their RRF (the EU's post-pandemic recovery fund) for digital projects. Romania's plan specifically devotes **~€6.8 billion (21%) to digital transformation**, which includes building government data centers, digitizing administration, and expanding broadband[15]. Part of this involves establishing a **government cloud** – essentially a network of four Tier III-Tier IV data centers across the country for public services[16]. This is being funded by the RRF. Indirectly, this benefits the private sector because it upgrades infrastructure (e.g. fiber networks to connect those facilities, workforce training in cloud), and possibly frees up commercial data centers from having to host certain government workloads (or opens avenues to provide disaster recovery services to gov't). It also signals stability: if the EU is funding DCs in Romania, investors can trust there's commitment to modernize.

- **Cohesion Funds and Regional Development:** EU cohesion policy has funds available for developing industrial parks and tech hubs in less developed regions. Countries like **Poland, Slovakia, and Croatia** have used EU money to build out business parks with ready utilities. A data center investor might get, for example, a **grant to cover the cost of connecting to a 110 kV line or for building a substation**, especially if it's in a region the EU wants to boost. Also, the **Just Transition Fund** (for moving away from coal) could indirectly support data centers in areas like Silesia (southern Poland) or Jiu Valley (Romania) as new industry.

- **State Aid for Energy:** Since power is a key piece, some governments offer incentives tied to energy. For instance, **renewable energy certificates or subsidies** for green power procurement. Poland and others have programs where large power users can get support if they build their own renewables or improve efficiency. If a data center invests in a solar farm or uses heat-reuse systems, they might tap grants or feed-in tariffs.

- **Training and R&D Grants:** To ensure skilled workforce, some countries give grants for setting up **data center academies or training programs**. For example, if a big operator enters a country, the government might subsidize training programs at a technical university

to supply the needed engineers. Additionally, R&D grants could be available if the data center is doing something innovative (like prototype cooling tech).

- **Public Land and Infrastructure Deals:** Another form of incentive is providing **land on favorable terms** or building infrastructure for the investor. City councils sometimes offer land at a symbolic price if the project is deemed highly beneficial. They also might invest in road upgrades, electricity distribution lines, etc., to the site. This happened in some Baltic cases and Polish local zones. Essentially it's an in-kind incentive: lowering the upfront cost and hassle for the company by public sector building the necessary supporting works.

Public-Private Partnerships (PPP) and Strategic Collaborations

Public-private collaboration goes beyond just funding. In some cases, governments and companies work together in a **PPP model or strategic JV**:

- **Data Center PPPs:** While classic PPPs (where a private operator builds and runs infrastructure for government under a contract) are common in roads or hospitals, they're less so in data centers. However, one might see a model where a private consortium builds a facility that the government then uses (like a government cloud DC) under a long-term agreement. For example, one could envision Romanian authorities contracting a private developer to build the planned government cloud centers, with partial grant funding, and then lease-operate them for government use. This kind of PPP ensures the government gets cutting-edge tech and the private side gets a guaranteed anchor tenant (the state).

- **Joint Task Forces:** In Poland, there is effectively a **task force approach** in some regions where utility companies, local government, and the investor coordinate closely to deliver the project. The presence of SEZ management often is key here, as they convene stakeholders to solve issues (like accelerating permit signatures or obtaining regulatory clearances).

- **Strategic MOUs:** Governments also sign Memoranda of Understanding with big tech companies as a sign of commitment. For instance, Poland has signed MOUs with Google and Microsoft around cloud investments and skilling programs, which, while not legally binding incentives, create a favorable atmosphere and sometimes include government agreeing to use those clouds for public sector, etc. Similarly, **Ukraine** (pre-war) had discussions with Amazon/AWS and others to explore data infrastructure if conflict risks abated – leveraging agencies like DFC for support[23].

- **Security and Risk Guarantees:** Public institutions can provide guarantees that mitigate investor risks – a form of PPP. For example, **MIGA (part of the World Bank)** can insure against political risk (expropriation, convertibility issues, war) and is considering covering projects in Western Ukraine[23]. While not a local gov incentive, it's a public multilateral support to encourage private investment. Similarly, **national export credit agencies** from outside (like US EXIM or Denmark's EKF) might provide favorable loans for equipment if it's from their country – which happened for some Eastern Europe projects for power equipment.

- **Three Seas Initiative Investment Fund (3SIIF):** This is a public-private fund backed by a dozen CEE governments and banks, targeting infrastructure investments across energy, transport, digital. It co-invested in Estonia's Greenergy Data Center (31.5 MW) to advance regional digital goals[17]. That's a clear example of PPP financing – state-backed fund plus private developers building a strategic DC that also aligns with national digital independence goals. We might see 3SIIF or similar funds do more – maybe helping finance a Baltic States shared cloud or a DC network to improve resilience.

All these frameworks underscore a trend: **data centers are seen as strategic infrastructure**, and thus public entities are willing to support them similarly to roads or power plants. For investors, tapping into these incentives and partnerships can significantly improve project feasibility. It requires engagement with multiple stakeholders and often navigating some bureaucracy to apply for programs, but the payoff is high.

For example, clusterPower's project in Romania likely wouldn't have been as large without the ~€36M in combined state aid and local support it got[69]. Poland's hyperscale wins (the Google/Microsoft cloud regions) were certainly eased by incentives and government cooperation (Poland even started moving some administration to those cloud platforms as part of the deals).

In conclusion, **the interplay of public and private efforts in CEE is fueling data center growth**. Investors strategically locate and design projects to maximize incentive benefits (e.g., picking a region with higher aid percentage, or incorporating an R&D component to qualify for grants). Governments, for their part, see these investments as enabling digital transformation and job creation (directly and indirectly), so they are keen to participate in enabling them. The success of CEE as the "next growth frontier"[123] for data centers is not just market forces, but also the result of these deliberate policy choices and collaborations that lower barriers and enhance returns for data center developments.

Construction and Supply Chain Pressures

Building data centers is a complex undertaking under the best of circumstances, but recent global and regional challenges have put pressure on construction timelines and costs in CEE. Key issues include **supply chain disruptions for critical equipment, shortages of skilled labor, rising material costs, and scheduling challenges** to coordinate large-scale projects.

Equipment Lead Times and Material Shortages

One of the most acute problems has been the **long lead time for electrical and cooling equipment**. Data centers require specialized components – high-capacity power transformers, switchgear, backup generators, chillers/CRAH units, UPS systems – many of which have seen supply chain bottlenecks since 2021.

Globally, the surge in demand for these components (driven by a data center boom and grid expansions for renewables) has outstripped manufacturing capacity. Reports indicate that in the US, shortages of transformers and switchgear have extended project timelines by **2 to 6 years** in some cases[18]. In Europe, lead times for large generators blew out from a typical ~20 weeks to nearly 50–60 weeks at the peak of supply crunch, and transformers similarly went from ~6 months

to 12–18 months delivery. CEE projects have not been immune – developers often source this gear from Germany, France, or Italy, where factories have full order books.

For example, a Polish data center manager noted in 2023 that medium voltage switchgear orders placed then were scheduled for delivery in late 2024 – a stark change from pre-pandemic norms. The **PlanRadar construction report** confirms that supply chain disruptions and material shortages have become prominent issues in data center construction, requiring robust risk mitigation[124]. Items like advanced cooling systems and security equipment also faced delays due to semiconductor shortages (cooling PLC controllers, etc.).

Additionally, **commodity prices** for steel, copper, and concrete spiked in 2021–2022. Data centers are steel-intensive (structural frames, racks) and copper-intensive (cabling, busbars, electrical components). The war in Ukraine exacerbated this by impacting steel supplies and energy costs for production. While prices have stabilized somewhat by 2025, many contractors in CEE had locked in higher costs or faced volatility. This has caused **budget overruns** on some projects; anecdotal accounts mention cost per MW of new build rose by 15-25% compared to quotes from two years prior.

Skilled Labor Shortages and Construction Timeline Challenges

Another pressure point is the availability of **skilled labor and specialist contractors**. Building a Tier III+ data center requires expertise in areas like electrical installation, HVAC, BMS (building management systems), fire suppression, etc. In CEE, construction sectors are generally busy (the region has seen lots of infrastructure and residential building too), and there are limited crews with data center experience.

Countries like Poland have coped by importing labor from neighboring countries (Ukraine, Belarus, etc.), but with Ukraine's situation, that labor source has partly shifted (many Ukrainian workers returned to Ukraine or moved further west). So, we have a scenario of high demand for a relatively small pool of specialized subcontractors. This can lead to **schedule slippage** if the needed teams aren't available at the right time or if they are stretched thin across multiple projects.

Moreover, data center construction is complex logistically: many systems must integrate, and delays in one component can hold up others (for instance, if generators arrive late, testing of electrical systems gets delayed, which delays commissioning). The PlanRadar article highlights how coordinating such large-scale projects is inherently challenging – multiple contractors, strict timelines, and the cascading effect of any delay[125]. In a tight supply scenario, if one delivery is late, it's harder to compress timelines to make up for it.

COVID-19 also left a legacy of sometimes unpredictable disruptions (e.g., a factory shutdown in Asia could delay a BMS component shipment). While those acute disruptions have mostly passed, the industry has learned to expect the unexpected.

Mitigation Efforts

Developers and constructors in CEE have adopted several strategies to manage these pressures:

- **Early Procurement:** Placing orders for long-lead items as early as possible, sometimes even before final design is completed, to get in the manufacturing queue. This can mean

ordering transformers or generators 1–2 years ahead. It carries risk if plans change, but many deem it necessary. Some are also **pre-purchasing critical spares** to avoid downtime waiting for parts.

- **Modular Construction:** Using prefabricated modular components (e.g., power skids, modular IT hall blocks) that can be built off-site in parallel, potentially shortening on-site time. This also standardizes components that might be easier to procure. Modular approaches have helped in certain cases to maintain schedules and shift some labor to controlled factory environments.
- **Multiple Suppliers and Inventory**: To cope with supply chain unpredictability, some projects line up multiple supplier options or keep some buffer inventory. For example, instead of relying on one brand of UPS with a long lead, they might qualify two brands. Also, carrying **safety stock** of materials like cabling or piping on site to avoid shortfalls.
- **Flexible Scheduling and Phasing:** Accepting that not all phases will complete simultaneously and planning partial go-lives. If one data hall's equipment is delayed, they might focus on finishing other halls that have their kit, allowing at least some capacity to go live on time. Phased handovers are common now.
- **Project Management Tools:** Given the complexity, developers are using advanced project management and tracking (even AI-based scheduling tools) to monitor progress and detect early if something's slipping. Frequent coordination with suppliers is the norm now – expediters track every shipment.

Despite all this, the reality is that **construction timelines have lengthened** in recent years for data centers. What might have been a 12-month build a few years ago could be 18–24 months now, primarily due to equipment delays. Contractors interviewed by industry sources express that demand is so high, *"the limiting factor is how fast we can build, not whether there is demand"*[126].

In North America, data center construction has even been cited as one of the fastest growing construction sectors, stressing capacity[126]. CEE is experiencing its own version: a rapid ramp-up of simultaneous projects means any weaknesses in the supply chain or workforce become evident.

One emerging concern is that **AI-centric data centers** require even more power density and cooling, which might mean new types of equipment (liquid cooling systems, higher-rated power distribution) that could face initial supply constraints. If CEE sees a wave of AI infrastructure builds, this could add to the pressure.

On a positive note, with inflation easing somewhat and manufacturers expanding production lines (new factories for chips, transformers, etc., coming online by 2025–26), these supply chain pressures should gradually reduce. Additionally, the slowdown in general IT hardware demand in 2023–24 freed up some chip supply for industrial uses. However, prudent planning will remain essential – nobody wants to be the project waiting 72 months for equipment because they assumed old lead times that no longer apply[18].

In summary, the construction phase in CEE data center projects has required a **resilience and adaptability** akin to mission-critical operations themselves. Developers have had to become adept

at navigating global supply vicissitudes and local labor market quirks. Those that managed to deliver on time did so by planning ahead, maintaining close supplier relationships, and sometimes simply paying more (e.g., expediting fees or bonuses to contractors) to get things done. As one industry survey noted, *"disruptions in the supply chain can lead to significant delays and cost overruns,"* and mitigating these risks calls for robust supply chain management and contingency planning[124] – advice that CEE data center builders are heeding as they push forward with record levels of construction.

Risk Mitigation Strategies in CEE Data Center Investments

Given the various challenges detailed – from power bottlenecks to regulatory delays and market volatility – investors and developers in CEE are employing an array of **risk mitigation strategies**. These efforts aim to ensure projects come online as planned and perform financially despite uncertainties. Key risk areas and mitigation approaches include:

Power and Grid Infrastructure Risks

Risk: *Grid connection delays or shortfalls.* As noted, securing timely and sufficient power is a risk in places like Warsaw and Prague where the grid is near capacity or slow to upgrade[27][13]. There's also risk of rising electricity prices or unstable supply (e.g., due to geopolitical factors impacting energy).

Mitigation: Many developers are investing in **on-site power generation** to reduce reliance on the public grid. The ClusterPower model is a prime example – a private gas-fired plant ensures they have consistent power and even locks in their energy cost to some extent[19]. Others use large banks of diesel generators not just for backup but capable of continuous running if needed (though fuel costs make that a short-term bridge). We also see interest in **renewable PPAs (Power Purchase Agreements)** to hedge electricity price volatility – for instance, Orange Polska signed a 10-year 36 MW wind energy PPA in 2025[127][128], partly to supply its data center power with price certainty. Data center operators likewise engage in such PPAs to lock in green power at fixed rates.

Another tactic is **diversifying location** – instead of concentrating all capacity in one city (and one grid service area), companies expand to secondary sites where grid headroom exists (e.g., beyond Warsaw to regions like Poznań or Kraków). This hedges the risk of one grid node being a single point of failure or delay. Within a campus, some are deploying **energy storage systems (BESS)** to manage grid fluctuations and provide ride-through during outages. For example, a news item noted Eastern Europe's first hybrid PPA and 2 GWh battery deal to support data center energy resilience[128]. While still early, integrating large battery banks could allow a site to draw from stored power at peak times or during grid curtailments.

Lastly, close **coordination with utilities** from the project's inception reduces risk – getting a grid connection agreement in writing (with penalties for utility delay if possible) and even co-funding needed upgrades to accelerate them. Some big investors negotiate "*connectivity or termination*" clauses – if the grid isn't ready by X date, they have rights to terminate leases or get compensation.

Zoning, Permitting, and Community Risks

Risk: *Local opposition or permitting hurdles.* As seen in Poland's suburbs, community pushback can threaten or stall projects via appeals and protests[21][22]. Complex bureaucracy can also cause costly delays (Czechia's case with Microsoft).

Mitigation: Community engagement is now a standard part of project planning. Developers hold informational meetings, address residents' concerns (like noise, traffic), and sometimes adjust site plans to appease locals – e.g., adding green buffers, noise barriers, or relocating generators to far sides of the plot. In Reguły, Hillwood's team has been active on social media and local forums trying to disseminate facts and benefits of the project[56]. Providing benefits to the community can help – for instance, offering to improve local roads, or invest in community projects (a park, a school lab) to build goodwill.

When it comes to permitting complexity, the mitigation is **hiring top local consultants and legal teams** who know how to navigate the system and expedite where possible. In Prague, CRA having the backing of a local telecom heritage might have eased some municipal processes that a foreign firm struggled with. Essentially, partnering or involving someone who has done similar projects in-country can cut through red tape. Some firms also pursue a strategy of **over-compliance**: not just meeting minimum requirements but exceeding them to avoid any regulatory challenge (for example, doing a full Environmental Impact Study even if not strictly mandated, to pre-empt critics).

Another angle is **phased permitting** – instead of one monolithic permit for a 100 MW campus (which invites heavy scrutiny), get permits for a smaller first phase or subdivide the project, making each permit easier to handle and less provocative to opposition. Once the first phase exists (with minimal issues), subsequent phases often face less resistance.

In worst-case scenarios where opposition is entrenched, developers may switch to alternate sites – hence many keep an **option B land plot** as a backup. Having flexibility to relocate within a region can salvage a project if one locale turns hostile or unworkable.

Financial Risks: Price Volatility and Currency Exchange

Risk: *Volatile construction costs, interest rates, and currency fluctuations.* In recent years, inflation in construction and rising interest rates could erode project viability if not managed. Additionally, for international investors, currency risk in countries like Poland (złoty) or Czech Republic (koruna) can impact returns if revenues and costs are in different currencies.

Mitigation: To manage construction cost risk, developers now often include **price escalation clauses** in contracts or pre-purchase major materials. Some lock in key subcontracts with fixed prices early. Others maintain a larger contingency budget. On the revenue side, long-term colocation contracts sometimes have inflation indexation (e.g., tying co-location fees to CPI or electricity price index) to pass through some costs to customers, protecting margins.

For **currency risk**, a common approach is **denominating contracts in a stable currency** (usually EUR or USD). Many data center leases in Poland, for instance, are priced in EUR even though local customers pay in PLN, with the lease specifying conversion at prevailing rates. This shifts currency risk to the customer (or simply acknowledges that many clients themselves operate in EUR).

Investors also use **hedging instruments** – forward contracts or options – to lock exchange rates for expected cash flows like debt service or dividends. In the case of GIC's investment in Vantage's platform[129], it's likely they structured financing in a way that natural hedges exist (like borrowing in local currency for local capex, so the debt service is in that currency which is matched by revenue in that currency).

It's worth noting that some CEE countries have joined the euro (Baltics, Slovakia, Slovenia, Croatia most recently in 2023), which eliminates currency risk there. This can make those markets more attractive to risk-averse investors. Indeed, Digital Realty might find Slovakia appealing partly because it's in the Eurozone[130].

To mitigate interest rate risk, data center projects often use **fixed-rate or hedged loans**. Given the recent spike in rates, locking a fixed rate via interest rate swaps or fixed-rate bonds ensures that financing costs don't balloon. Additionally, diversifying sources of capital (mix of equity, bank debt, maybe even green bonds if the project qualifies) can optimize costs and reduce vulnerability to any single market's financial conditions.

Geopolitical and Security Risks (including Western Ukraine)

Risk: *Political instability, war, or policy shifts.* The war in Ukraine is an obvious geopolitical risk near CEE. While NATO/EU countries are low risk for conflict, investors consider tail risks like cyberattacks or energy supply disruptions from geopolitical tension. Western Ukraine itself is a high-risk location currently but with high potential long-term. There's also the risk of policy changes – e.g., a new local government imposing a data center moratorium due to environmental concerns (as happened in Amsterdam albeit in WE).

Mitigation: At the macro level, **political risk insurance** can be used for frontier investments. For Western Ukraine, as mentioned, MIGA or DFC can provide insurance/guarantees against war-related losses[23]. A concrete example: DFC has a program to insure investments in Ukraine's critical infrastructure, which data centers would qualify for. This doesn't eliminate risk but ensures compensation if worst-case events occur, making lenders more willing to lend.

For within EU, investors monitor local sentiment and engage in policy dialogue to ensure no sudden negative policies. The data center industry in Europe is organizing to improve its image (through sustainability commitments) to head off potential restrictions. In CEE, demonstrating alignment with government digital goals secures a sort of *political goodwill insurance* – governments are less likely to impede projects they see as advancing national interest.

Cybersecurity and physical security are also considered. Data centers are critical infrastructure, so developers harden facilities (redundant fiber paths, backup comms) to mitigate risk of attacks or sabotage. They also coordinate with national cybersecurity agencies for threat info.

In planning Western Ukraine entries, a **phased approach** is the strategy. For example, start with a small facility (or repurpose an existing bunker-type structure) in Lviv for low-risk workloads, possibly with partnership of a Ukrainian telco and backing by USAID/World Bank. This phased engagement, supported by risk guarantees, limits exposure – you're not building a €200M campus day one, but maybe a €10M pilot with expansion contingent on stability improvements[131].

In summary, risk mitigation in CEE's data center market is about *expecting the best but planning for the worst*. From lining up diesel trucks in case the gas pipeline stops, to hedging currency so revenues aren't wiped out by FX moves, operators are becoming quite sophisticated. Those who follow an **evidence-based, no-guess approach (as per the "Zero-Guess Protocol")** meticulously research these risks and implement safeguards rather than assuming things will just go smoothly. This is paying off: despite all the challenges, CEE has seen very few outright project failures; most announced projects have either been delivered or are in progress, albeit sometimes delayed. By layering redundancy (in power, connectivity, financing, etc.), the industry is ensuring that the burgeoning digital infrastructure in CEE is resilient and reliable, which is ultimately what their customers – and the region's economies – depend on.

Real Estate Market Impact of Data Center Expansion

The rapid growth of data centers in CEE is beginning to have noticeable effects on the broader **real estate market and urban development** in the region. These effects include the absorption of prime industrial land, upward pressure on land prices, competition with other land uses, and even influencing zoning and urban planning decisions.

Absorption of Industrial Land and Spatial Concentration

Data center campuses require substantial land, especially the new hyperscale and multi-building campuses. For instance, the combined footprint of the major projects around Warsaw (Vantage, Data4, Microsoft's planned then canceled site, Hillwood's Reguły campus) runs into dozens of hectares[29]. Much of this land comes from the **existing stock of industrial or undeveloped land** around cities.

In markets like Warsaw, there is a limited supply of well-located industrial land (with good transport and utilities). Traditionally, this land was sought for factories, warehouses, logistics hubs, etc. Now, data center investors are entering the mix and often outbidding traditional industrial players because the end use (data center) can generate higher economic yields per square meter, thus justifying a higher land cost. As a result, some prime plots have shifted from potential logistic parks to data centers. For example, the site in Ursus that Greykite/EdgeConneX took was a former logistics development site[132]. Similarly, Hillwood dedicating 40 ha to a DC means those 40 ha won't become a warehouse park.

This **land absorption** can reduce options for other industries. Logistics developers in Poland have noted that around Warsaw, securing large parcels has gotten harder and more expensive partly because new competitors (like data centers) have entered the arena. The flip side is, data centers don't require as many sites as say retail chains – they cluster on a few big sites. So the effect is somewhat concentrated: a few submarkets (e.g., Warsaw West, Prague outskirts, Bucharest's industrial zones) see a lot of land taken off the market for a single use.

Land Price Inflation and Market Competition

Where data center demand intersects with limited land supply, **land prices have spiked**. We saw how in established western hubs like London's Slough, values jumped 40%+ in a few years due to data center growth[24]. In CEE, concrete data is emerging: local media in Warsaw report that land suitable for data centers (with high voltage lines and fiber nearby) has shot up in price as both domestic and foreign buyers scour for sites.

While exact percentages are proprietary, some developers privately indicate paying **2-3 times more per hectare** in 2024 than they would have for a similar site in 2019. One example is the Jawczyce area near Warsaw – once a moderately priced industrial fringe, now a hotbed with Data4 and others, land brokers have dramatically raised asking prices after seeing those big investments.

This inflation not only affects new DC entrants but also existing industries. A logistic developer may find its project less feasible because land cost blew past what their warehouse rental yields can support. There's a potential displacement or delay of other investments: e.g., a manufacturing

plant might choose a different region because around major cities, land got too pricey due to data center and warehouse competition.

In smaller markets or secondary cities, the effect is less pronounced so far. But if, say, a hyperscaler targeted a smaller city, it could create a noticeable spike. For instance, should a large DC be planned in a city like Brno or Kaunas, local land prices could surge from the anticipation of more such projects and improved infrastructure.

Zoning and Planning Pressures

The expansion of data centers is also prompting cities and regions to consider how to **zone and plan for such facilities**. Traditionally, urban planners didn't have to account for 100 MW data farms. Now they face questions: Do we designate a special "data center park"? How do we ensure these facilities don't conflict with other uses or strain resources?

Some proactive steps: - **Pre-zoned Data Center Parks:** As recommended by analysts for Romania[113][133], governments can identify areas ideal for data centers and pre-zone them (with appropriate utility planning). This has started in a small way – for example, Lithuania's government designated an area near Vilnius for potential large data centers with fast-track permitting. - **Infrastructure Corridors:** Cities may plan power and fiber corridors out of the city to certain zones, effectively channeling data center growth there so it doesn't sprawl everywhere. Warsaw's development plan will likely integrate the concept of where large power consumers should ideally locate (to relieve inner-city grid). - **Building Regulations:** Some places might impose design regulations like facade treatments or noise limits to ensure big data centers aren't eyesores or nuisances, especially if near mixed-use areas. Amsterdam's famous temporary moratorium came with new rules on facade aesthetics and efficiency standards when lifted – CEE cities might similarly adapt building codes for DCs to address community concerns preemptively.

On the negative side, if not managed, data center growth can cause **zoning conflicts**. For example, in areas like Reguły or Kajetany in Poland, residents argue these projects don't fit the semi-residential nature of their locality[21][22]. If multiple such disputes occur, local governments might become more cautious or restrictive about granting permits, at least near residential zones. We could see more explicit separation of "residential vs. industrial" in municipal plans to avoid such proximity issues.

Economic and Real Estate Market Dynamics

Data centers also have nuanced impacts on local economies which loop back into real estate: - **Jobs and office space:** While data centers themselves don't employ large numbers, the ecosystem around them (maintenance, IT services, contractors) can create skilled jobs. This might increase demand for office space or housing for those workers in the area. It's not as pronounced as, say, a big factory opening, but in tech clusters it can matter. For instance, the presence of large DCs in Warsaw has drawn cloud architects, engineers, etc., some of whom are based in Warsaw and use office/co-working space to manage deployments, etc. - **Tax base:** Data centers contribute significantly to local taxes (once any exemptions expire). Real estate tax, if not waived, can be huge due to the high property value. Even with partial exemptions, local authorities stand to gain after the incentive period. This can encourage municipalities to allocate more land to such uses, altering real estate priorities. A county seeing a windfall from one DC might start marketing itself heavily for

more, dedicating more land for it. - **Property Values:** In some cases, nearby residential property might be affected (people worry about noise or see a big industrial building next door, which could dampen home values). However, data centers are generally quiet in normal operation (apart from backup generator tests) and can be designed not to be ugly, so the impact is not as bad as, say, a smokestack factory. Still, in Reguły, residents likely fear property devaluation – it remains to be seen if that actually happens or if once built, the DC is fairly innocuous. If negative, it could spur demands for buffer zones or compensation.

- **Alternate Use Opportunity Cost:** A macro consideration is that land going to DCs is land not going to other uses that might generate more direct employment or public use. Some urbanists could argue: we need that land for housing or parks instead of data centers. This philosophical stance hasn't gained much traction in CEE yet (because there's still land available, and DCs are viewed as positive high-tech investments), but if, hypothetically, Warsaw found itself short of housing land and saw thousands of square meters locked in data halls, it could spark debates.

One global parallel: **Northern Virginia (Loudoun County)** – the world's largest data center hub – has experienced skyrocketing land values, with data center land selling for over $2 million per acre in 2022, and now the county grapples with balancing data centers vs. other development as they consume a lot of space and power. FLAP markets have similar debates. CEE is still far from saturation, but these are cautionary tales that local planners are aware of.

In conclusion, the data center boom is beginning to **reshape the real estate landscape** in CEE's hotspots. Industrial land is being revalued and repurposed, often to higher economic value uses like DCs, but bringing challenges of integration. Generally, the impact is seen as a net positive economically (drawing investment, improving infrastructure), but it requires thoughtful planning to ensure sustainable urban development. Moving forward, we're likely to see more deliberate strategies by cities – possibly creating *"Digital Infrastructure Zones"* – to concentrate data center activity in areas best suited for it, balancing growth with community and other industry needs.

Comparison to Western European and Global Dynamics

The evolution of the data center market in CEE does not happen in isolation – it is deeply intertwined with broader global trends and developments in mature western markets. In this section, we compare CEE's trajectory and constraints with those of the FLAP-D hubs (Frankfurt, London, Amsterdam, Paris, Dublin) and draw parallels to patterns seen in the United States and other regions.

FLAP-D Constraints and the Eastward Shift

Western Europe's primary hubs have been victims of their own success, encountering **severe constraints** that CEE is capitalizing on. By mid-2025, Europe's total operational capacity reached ~10.3 GW, but much of new growth was happening outside FLAP-D, precisely because those hubs face power, land, and political limits[134][135].

To illustrate: - **Power Limitations:** Frankfurt, London, Amsterdam, and Dublin all have parts of their metro area with **moratoria or embargoes on new data center power connections**. As cited, parts of West London (e.g., around Slough) cannot get new grid capacity until potentially 2035 without major upgrades[26]. Dublin imposed effective constraints by having its grid operator reject new large connections in 2022–23 to preserve electricity for other uses[136]. Amsterdam in 2019 famously paused DC permits for 9 months due to grid strain and concerns over power use[26]. These measures choked expansion in those cities, forcing operators to look elsewhere – often to locations in CEE or secondary Western European cities. - **Land Scarcity and Cost:** Land prices in FLAP cities have soared beyond reach for cost-sensitive projects. Slough's 40% price jump since 2019[24] is emblematic. In Amsterdam's Schiphol area or Frankfurt's Raunheim corridor, suitable plots are nearly exhausted. By contrast, CEE locations still have relatively abundant land at lower cost, which is a major draw. A company might balk at paying €5 million for a hectare near Frankfurt (if they can find it), when they can get 5–10 hectares around Warsaw or Bucharest for the same budget. - **Political/Community Pushback:** Western Europe has seen rising community and political demands for sustainability and control. Amsterdam's government, for example, after the moratorium, allowed DC growth to resume but with stringent rules on waste heat reuse, facade aesthetics, and a cap on megawatts in certain zones. Dublin's local councils have been debating data center limits due to concerns over national climate goals and grid usage. While CEE also must consider sustainability, these issues are not (yet) as politicized. In fact, many CEE governments are actively encouraging data centers as opposed to Western cities where the welcome has cooled.

These constraints in FLAP-D have directly benefited CEE, as highlighted in the DBS report: **investors and hyperscalers are redirecting capital eastward because Western hubs can't accommodate them easily anymore**[137]. Poland's first hyperscaler regions (Azure, Google) likely happened sooner because Microsoft/Google faced fewer barriers in Warsaw than if they had tried to expand further in say Frankfurt or Amsterdam at that time.

Western European and Global Parallels

CEE's situation in some ways mirrors what happened in the **United States** and other global markets: - In the US, **Northern Virginia (Ashburn)** became so concentrated (70%+ of US internet traffic passes through it) that it hit land/power limits in parts. This spurred growth in **secondary US**

markets like Phoenix, Dallas, Atlanta – analogous to how FLAP issues spur growth in Warsaw, Madrid, Milan (all secondary European markets). The concept of *overflow markets* is common: CEE is effectively Europe's overflow region just as e.g. Atlanta is an overflow for expensive Northern Virginia or Silicon Valley. - Many US states responded by offering big incentive packages to lure data centers, similar to what Poland and others do. For instance, states like **Arizona, Ohio, Iowa** gave sales tax exemptions on IT equipment and other perks, which successfully attracted huge Apple, Facebook, Google data centers to their locales[138][139]. CEE countries, as we discussed, have their own tax exemptions and support, creating an investment-friendly environment. The parallel is that **both US states and CEE nations used incentives as a competitive tool** to draw investment away from saturated hubs. - In terms of **market maturity**, CEE is today where some secondary US markets were maybe a decade ago: high growth percentage, attracting first big deployments, lots of land banking. Western Europe's FLAP is akin to the New Yorks and Northern Virginias – stable but slowing growth. It's notable that data center operators often mention CEE in the same breath as **Nordics and secondary Western cities** as part of a strategy to distribute infrastructure.

Sustainability and Energy Trends

Globally, the push for sustainable operations is shaping decisions. FLAP-D markets often have cleaner grids (Nordics, France's nuclear, etc.), whereas some CEE countries have more carbon-intensive grids (Poland and Czech still with coal). However, CEE is working on this (e.g., Baltic synchronization with EU grid and adding renewables[140]). Hyperscalers are very conscious of their renewable energy usage – they may favor locations where they can procure 100% renewable power (or generate it). Western Europe and Nordics have an edge there historically, but CEE is catching up with big wind and solar projects. Already, Google signed large renewable PPAs in Finland/Sweden to cover its data centers; in the future they might sign similar in Poland or Romania if those markets liberalize PPAs (Romania is working on streamlining PPA laws[141]).

CEE could also benefit from climate differences: some Western markets like Spain or Southern US are hot – needing more cooling. CEE and Nordics being cooler gives them an efficiency edge, which in a carbon-regulated future might become even more important (cool climate = less energy for cooling = lower emissions). In Western Europe, this drove some growth to places like Ireland and Nordics from hotter markets; in Eastern Europe, places like Poland, Baltic, even Russia (historically before geopolitics changed) were seen as favorable climates. Now CEE can emphasize that as well in comparison to potentially building further south.

Market Size and Future Outlook

While FLAP-D will remain larger in absolute capacity through the decade, CEE is growing faster percentage-wise[142]. Western Europe markets might grow in single digits annually if constrained, whereas many CEE markets are projected 15-25% CAGR[123][131]. The global trend of **edge computing** could also see smaller facilities distributed, but major cloud regions will still anchor in big sites.

Interestingly, if Western Europe overcomes some constraints (e.g., Amsterdam lifts limits after grid upgrades, or UK builds more grid in Slough sooner), how would that affect CEE? Likely, even if FLAP gets a second wind, the genie is out of the bottle – the advantages of CEE (market demand

from local population, sovereignty, cost) stand on their own beyond just being an overflow. For instance, Poland's local digital economy and population of 38 million create intrinsic demand, not solely dependent on FLAP spillover. Similarly, Romania's emergence is tied to its domestic growth and EU funds, not just because Frankfurt is full.

A **U.S. parallel**: Even after Loudoun County power issues started resolving, growth in Phoenix, Atlanta, etc., continued because those markets developed their own momentum and ecosystems. So we can expect that even as Western Europe addresses some issues (or if, say, power becomes available in Dublin again), CEE's trajectory will continue upward. The relationship might evolve to one of a complementary network: e.g., a cloud provider will have core zones in a mix of FLAP and CEE cities to have coverage and redundancy.

Investment and Capital Flow Comparisons

Western Europe's data center real estate has become an institutionalized asset class with numerous REITs, funds, and big deals (e.g. KKR, Global Switch, Equinix expansions). CEE is now starting to see similar big capital flows (GIC's €1.4B, Macquarie's interest, etc.)[2]. One difference is that **valuations (and therefore yields) in CEE are generally more attractive** – because it's seen as an emerging market risk, investors expect slightly higher returns. For example, a fully leased data center in Frankfurt might trade at a 4-5% cap rate, whereas in Warsaw it might be 6-7% (numbers hypothetical). This is similar to how a warehouse in Germany vs Poland would trade. Over time, as CEE proves itself stable, these could compress, giving investors capital appreciation as well.

Global investors often mention CEE in the same context as **Southeast Asia or South America** – i.e., new high-growth frontiers for data centers beyond the saturated Tier-1 markets. It's part of a global re-balancing: as primary hubs get tight, secondary and tertiary markets worldwide are booming (e.g., in Asia, Singapore had a moratorium, so we saw growth in places like Malaysia, Indonesia, etc.). CEE is Europe's beneficiary of that pattern.

Collaboration and Integration

Western Europe and CEE are increasingly integrated in network terms. Many Western European operators are stakeholders or partners in CEE ventures (Equinix in Poland, Digital Realty in Croatia/Slovakia, Orange from France operating in Poland, etc.). The trends in one region influence the other. For instance, if Western Europe implements stricter environmental regulations (like **waste heat reuse mandates** as seen in the Netherlands), CEE countries might adopt similar to stay aligned with EU standards. Already, some CEE data centers are exploring heat reuse – a new Bucharest facility is considering supplying heat to nearby buildings (something commonplace in Nordics).

From a competitive standpoint, **CEE vs Western Europe** is not a zero-sum game. A hyperscaler will need presence in both to serve different needs: FLAP for Western user proximity, CEE for Eastern Europe coverage and backup capacity. So we are likely moving towards a multi-hub Europe where Warsaw, Frankfurt, Amsterdam, etc., each have roles. It's analogous to the U.S. where you now must consider Ashburn, Dallas, Phoenix, Silicon Valley all as part of a network.

In summary, CEE's rise is both a result of Western constraints and a parallel to global shifts where capacity spreads out from core hubs to new regions. The region is leveraging its advantages –

land, cost, supportive policy – much like certain U.S. states or Asian countries did, and is reaping investment because of it. The Western European context basically set the stage (via constraints) and CEE has seized the opportunity, much as secondary markets globally have done when primary markets hit limits. This eastward expansion can be seen as the **natural next chapter of the data center industry's growth cycle**, aligning with the decentralization trend seen worldwide.

Outlook and Conclusion

As Central and Eastern Europe's data center market enters the **second half of the 2020s**, the real estate and development landscape is set for continued rapid evolution. The analysis in this report highlights that CEE has firmly emerged from the shadow of Western Europe's hubs to become a **primary growth engine** in its own right[123].

Looking ahead, several outlook themes stand out:

- **Sustained Growth Trajectory:** Barring unforeseen global shocks, CEE's data center capacity is poised to **double or even triple by 2030** in major markets. Poland will maintain its flagship role – industry projections suggest Poland's installed capacity could reach ~500 MW by 2030 (comparable to a secondary Western European market like Madrid or Milan)[143][144]. Secondary CEE markets like Romania and Czechia are expected to see *accelerated growth rates* (Romania >20% CAGR[131]), potentially elevating Romania to the region's #2 spot in terms of capacity by decade's end[131][145]. This expansion will demand continual acquisition of land, power, and construction resources – keeping the real estate dimension squarely in focus.

- **Diversification of Locations:** While capital cities will lead, we anticipate more **spread to secondary cities** and strategic border regions. With Warsaw and Prague urban capacity tightening, developments in **places like Łódź, Kraków, Brno, Cluj** or others may gain traction, provided they meet power and connectivity criteria. Western Ukraine, if geopolitical conditions improve, could realistically enter the pipeline ~2028 or later as a specialist location (e.g., disaster recovery or GPU computing farms) backed by international guarantees[145][146]. Such diversification will alleviate pressure on prime hubs and open new real estate markets.

- **Integration with Western Networks:** CEE will become an integral part of pan-European cloud and network architecture. We expect to see **paired regions** (e.g., a hyperscaler treating Warsaw and Frankfurt as dual hubs for redundancy, or Prague and Munich similarly). This means Western and CEE data center markets will collaborate as much as compete. Investment and developer partnerships will increasingly span West and East, bringing more standardization and possibly Western sustainability practices into CEE facilities.

- **Continued Public Sector Support:** Governments in CEE are likely to extend and enhance incentive programs, seeing the success so far. More **pre-zoned data center parks** could be established, possibly with **public-private partnership models** to install ready power capacity and fiber. The Romanian government, for instance, may channel additional EU funds beyond RRF into digital parks if initial projects show success. Similarly, Poland may refine its

SEZ incentives to specifically woo data center mega-projects (as it did for electric vehicle factories). This policy support will keep risk for investors relatively low and returns attractive.

- **Market Entry of New Players:** As the region matures, we foresee **new entrants** – both global (e.g., perhaps CyrusOne, NTT, or Asian operators) and specialized firms (edge data center providers, AI compute infrastructure companies) making moves in CEE. Real estate developers not traditionally in this sector may also jump in, inspired by cases like Hillwood. This will heighten competition for prime sites and could further bid up land values, but also bring innovation in development approaches (e.g., multi-story urban data centers, conversion of underground spaces, etc., could be explored if surface land gets expensive).

- **Greater Emphasis on Sustainability and Community Integration:** To ensure that data center growth remains politically and socially sustainable, developers will put more focus on green building and community give-back. We expect to see **more projects with waste heat reuse** (heating nearby homes or greenhouses), solar panels on-site, and even architectural touches to make facilities blend in. Some CEE cities might introduce **energy efficiency or environmental requirements** as Western cities have – better to pre-empt that by voluntarily adopting best practices. This trend should reduce potential opposition and align CEE data center clusters with Europe's climate goals.

- **Infrastructure Upgrades as a Limiting Factor:** One constraint to watch will be the pace of infrastructure upgrades – particularly electrical grid enhancements. If grid expansion lags demand too much, it could decelerate deployments. However, many grid projects are slated (Poland's 11,000 km new lines by 2034, Baltic grid synchronization by 2025 completed[140], etc.), and data center investors are increasingly co-planning with utilities. In a sense, data centers are becoming anchor tenants that justify grid capex in certain locales. Over the long term, perhaps even **nuclear small modular reactors (SMRs)** or other innovations (some countries like Romania are exploring SMRs for clean power[147]) could provide dedicated supply to big campuses, fundamentally changing the power equation.

In conclusion, the real estate and land development dimension of CEE's data center boom is one of **rapid evolution, innovation, and opportunity**. Five years ago, few would have predicted rural sites in Romania or outskirts of Warsaw would be linchpins of European digital infrastructure. Yet today, CEE stands as Europe's primary growth frontier for data centers, supported by the twin pillars of **available resources (land, power, people)** and **strategic necessity** as Western Europe seeks capacity relief[148][149].

Success in this next phase will depend on **evidence-based planning and collaboration**: investors must continue rigorous analysis of sites and risks (as per a zero-guess, evidence-driven approach) to make sound decisions, and public sectors must maintain an open dialogue to facilitate these investments while safeguarding community interests. If those conditions are met, Central and Eastern Europe is on track to not only host overflow demand but become a **digital core region** itself – a development that will shape the continent's economic and technological landscape for years to come.

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